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A faint, out-of-focus background image of a classical building, possibly a temple or a government building, featuring four prominent columns and a triangular pediment at the top. The building is rendered in a light, warm color, blending with the overall yellowish tint of the page.

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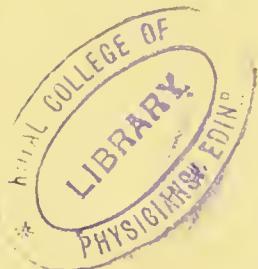


A PRACTICAL RESUME
OF
MODERN METHODS EMPLOYED IN THE TREATMENT
OF
CHRONIC ARTICULAR OSTSTITIS
OF THE HIP.

BY

CHARLES F. STILLMAN, M.Sc., M.D., CHICAGO,

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Fellow of the Chicago Academy of Medicine, etc.*



1891.
GEORGE S. DAVIS,
DETROIT, MICH.

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1891.

This volume is respectfully dedicated

TO

J. KIRTLAND MYERS, Esq.,

OF

PLAINFIELD, NEW JERSEY,

as a token of personal esteem,

PREFACE.

This work has been compiled with the object of acquainting practitioners and medical students with the most recent views held by orthopœdic writers upon the management of hip disease.

It also aims to familiarize them with the methods they advocate and employ in practice, and to secure accuracy and reliability the author has made as few changes as possible in the publications and private letters which have been utilized in its preparation. The treatment of this disease has undergone such marked alterations within the past few years that a work of this kind—prepared entirely without prejudice—is deemed a professional necessity at the present time.

125 State St., Chicago, Ill.
Sept. 1st, 1891.



A PRACTICAL RESUME OF MODERN METHODS EMPLOYED IN THE TREATMENT OF CHRONIC ARTICULAR OSTITIS OF THE HIP.

The treatment of the morbid conditions comprised under the term "Chronic Hip-Joint Disease" may be considered under two heads, viz.: (1) Therapeutic, and (2) Operative.

The latter will not be considered in this volume, in which it is the purpose of the author to clearly and concisely place only the first or therapeutic division before the profession, in order that a busy practitioner can make his own selection of the form of procedure he may wish to pursue in the treatment of any special case, without the labor of referring to the writings of as many authors as would otherwise be necessary.

With this object in view the various methods of treatment and forms of apparatus to be described in these pages are classified as follows:

- A. THE PHYSIOLOGICAL TREATMENT
(Hutchinson).
- B. THE EXPECTANT TREATMENT
(Gibney).
(Buckminster Brown).
- C. APPARATUS FOR TREATMENT DURING RECUMBENCY.
 - (a) *Portable frames:*
 - I. Bonnet.

2. Sayre.
3. Guersant.
4. Bradford.
5. Steele.
6. Phelps.

(b) *Bed Treatment by Buck's Extension:*

Sayre.

Moore.

D. APPARATUS PERMITTING LOCOMOTION.

(a) *Fixation without traction:*

1. Moulds of plaster-of-Paris, etc.
2. Bouvier.
3. Vance.
4. Thomas.
5. De Forest Willard.
6. E. J. Chance.

(b) *Fixation with linear spinal traction:*

Bartow.

(c) *Extension splints:*

1. Without spinal support (facilities for motion present).
 - a. H. G. Davis.
 - b. Andrews.
 - c. Bauer.
 - d. C. F. Taylor.
 - e. Sayre.
 - f. Shaffer.
 - g. M. J. Roberts.

2. Without spinal support (facilities for motion absent).
 - a. Lovett.
 - b. Judson.
3. With spinal support.
 - a. Phelps.
 - b. Blanchard.
 - c. Stillman.

DIVISION NO. 1.

A. THE PHYSIOLOGICAL TREATMENT:

This was first brought into prominent notice as a distinct method by Prof. J. C. Hutchinson, of Brooklyn, in 1879, and is perhaps the simplest form of treatment in vogue. It consists in the employment of a pair of crutches, with a high shoe upon the healthy limb, so that the limb with the diseased hip will swing clear of the ground while the patient walks and thus protect the joint from concussion. A restrictive appliance may also be used to limit the amount of motion. See fig. 13.

In practice, this method is now very rarely used except in conjunction with various hip splints.

As a distinct mode of treatment it has not proved satisfactory, as traction is only exerted when the patient is standing or walking, and the limb is pendant.

DIVISION NO. 2.

B. THE EXPECTANT PLAN OF TREATMENT:

This has been well described by Dr. Gibney,*

* Diseases of the Hip, by V. P. Gibney, 1884, p. 324.

of New York City, as a method directed to the exacerbations. He states that the claims set up for the expectant treatment are:

1. *As good results obtained as by other methods.*—This he regards as not proven.

2. *Less expense and inconvenience to the patient.*—Regarding the second, he says that the extensive abuse of mechanical appliances has brought them into disrepute, and that the expense is a serious drawback, many patients objecting to the cumbrousness of these appliances, many of which are ill-fitting and fail to meet the indications. But he wishes it to be fully understood that so far as his own observation goes, *well-fitting* splints render the patients very comfortable, and the relief they experience from pain and muscular spasm is so great that it is difficult to bring about a suspension of their use.

3. *The nutrition of the limb is not impaired.*—He takes exception in regard to this claim, and considers that the clinical history abundantly proves that the nutrition of the limb suffers *with* or *without* the use of apparatus, and that atrophy is one of the most valuable signs in diagnosis.

In the expectant treatment he considers relief from pain as the most important object, and this being accomplished, the restlessness at night, loss of appetite, etc., are of minor consideration. He states that rest in bed and a roller about the hips in the form of a spica bandage generally suffice to relieve in a mild

exacerbation. He considers an opiate seldom necessary, and has seen many cases yield promptly to the application of strong tincture of iodine, which is succeeded by blistering if this fails. He is of the opinion that by far the surest method is fixation and traction, the weight and pulley sometimes acting like a charm, and one exacerbation being passed, no further interference is called for until the next one approaches. When there is much lameness he considers that crutches form a valuable acquisition to our armamentarium, whether employed in conjunction with a high shoe, or a patten on the sound foot, or whether they are employed without the shoe. In both the aim is to rest the hip and at the same time to permit of out-of-door exercise. Those who adopt what is known as the Hutchinson method, viz., the crutches and high shoe, he claims seldom persist in it longer than a few months, for, after an exacerbation has passed, the little patient becomes more confident of his powers, and the crutches are soon discarded.

His conclusions as to the value of the expectant method of treatment, after an extended trial, are:

1. "In a *very few* cases of chronic articular osteitis of the hip good results are obtained.
2. "In the large majority of cases it is utterly inadequate either to arrest the disease or secure the best possible result, irrespective of the stage in which the treatment is begun.
3. "Whenever one can feel assured that he has a

genuine case of chronic articular osteitis of the hip, science demands, humanity demands, that the so-called expectant method should form no part of the treatment. This rule admits of few exceptions.

4. "When one is in doubt as to the diagnosis, and the preponderance of evidence seems to be against the lesion being one in the bones entering into the articulation, the expectant method should be adopted pending the period of doubt.

5. "If the evidence is in favor of a bone lesion, abandon the expectant treatment."

DR. BUCKMINSTER BROWN'S TREATMENT.

In response to a request from the author, the following letter was received, and is reproduced *verbatim*. As one of the successful pioneers in the orthopaedic branch of surgery, Dr. Brown's views are of value, as they represent the result of a very long, large and varied experience.

BOSTON, Mass., May 28, 1890.

CHARLES F. STILLMAN, M. D.

DEAR DOCTOR:—Your letter of April 8th is received. You ask me for a description of the methods which I advocate for the treatment of hip disease. A full reply to this question would require a much longer letter than I am at present able to write. I can simply say that I advocate, for the most part, conservative treatment—rest, complete, prolonged rest, and fixation with traction if indicated, during the early stage. By rest, I mean horizontal position and appliances to secure immobility as far as possible. Later,

when the joint is in a condition to allow of locomotion, it should be guarded and relieved from pressure by some one of the numerous apparatuses which have been invented with this object in view. In regard to abscesses, my views and treatment are in a high degree conservative, except in cases of residuary abscess. Much has been written on chronic osteitis, but I have above imperfectly expressed in a few words the results of my observation and experience.

Very truly yours,

BUCKMINSTER BROWN.

DIVISION NO 3.

C.—APPARATUS FOR TREATMENT DURING RECUMBENCY.

1. *Bonnet's* Portable Frame.*—This is represented in Fig. 1, and has since been modified and

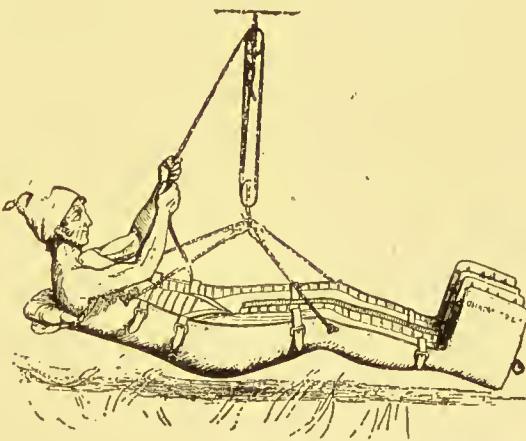


FIG. 1.—Bonnet's cuirass.

* Bonnet (A.) (de Lyons). Nouvelles methodes de traitement des maladies articulaires. Lyon, 1859.

improved by Sayre (see Fig. 2). It is provided with means for extension of the limbs, the directions being to have the portions in which they lie about ten inches longer than the limbs, and to the extremities of these pulleys are attached, through which cords and weights are utilized to effect the extension.

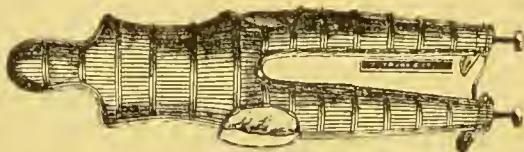


FIG. 2.—Sayre's modification of Bonnet's wire cuirass.

This apparatus does not secure complete immobility of the joint, and, like all others of its class, causes the healthy limb to remain in a wearisome position.

It is expensive, and the padding with which it is furnished is apt to quickly become soiled.

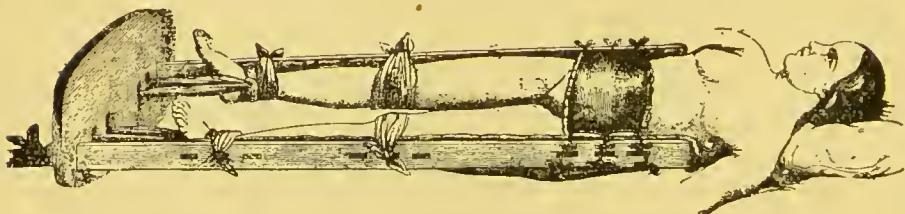


FIG. 3.—Guersant's portable frame.

Guersant's apparatus (see Fig. 3) consisted of two long side bars, terminating in a high foot board. This

foot board was made of the shape shown in Fig. 3, to keep the bedclothing of the person of the patient.

Bouvier* made an addition to this cuirass by which he strove to separate or draw together the limbs in order to overcome respectively the adduction and abduction, and Bradford and Lovett† recommend for those cases in which a recumbent position is necessary for a time the use of the bed frame shown in Fig. 4, to which traction may be added by means of a traction splint (see Fig. 5).

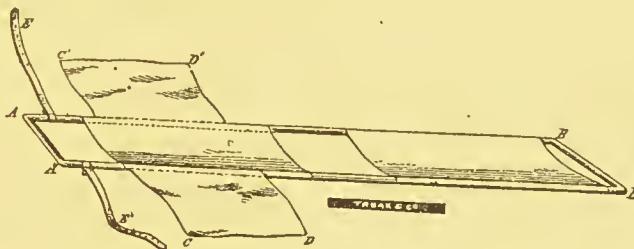


FIG. 4.—Bradford's portable coxitis frame.

They claim that a patient can be carried about upon this frame as readily as upon a *gouttière de Bonnet*, and that the appliance is much cheaper, more readily made and adjusted, and more comfortable.

In cases without deformity a traction-attachment, they consider, can be furnished to the end of the frame, and this can be used instead of employing a

* Arsenal de la Chirurgie contemporaine. Paris, 1867. Pp. 345 and 346.

† Bulletin de Therapeutique, 1864; t. 67; p. 496.

traction splint; but in cases where recumbency is needed but a short time, the ordinary frame with the traction splint will be found to be satisfactory.

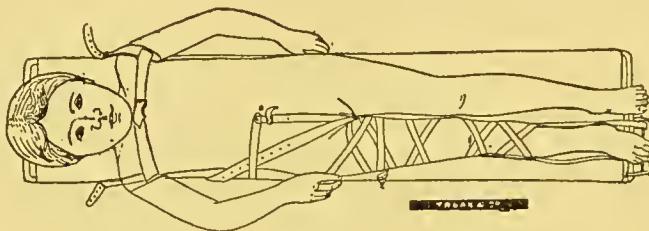


FIG. 5.—Bed frame, with traction apparatus added (after Bradford and Lovett).

Dr. Bradford has published the following conclusions:

“The treatment of hip disease should be based neither upon any one method nor upon the use of any

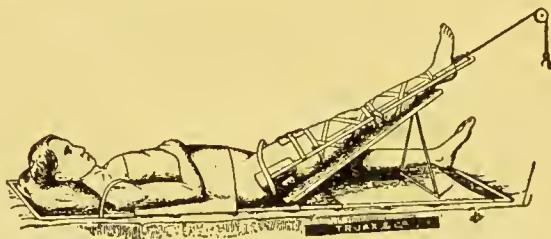


FIG. 6.—The same with addition of incline plane.

splint. In the course of a long affection involving the femur, the joint, and the adjacent tissues, certain changes take place. The morbid condition is an

ostitis near the joint, and the subsequent invasion of the latter, or a primary synovitis exciting a neighboring osteitis; the process is accompanied by a spasmodic contraction of the neighboring muscles, which aggravates the inflammation by increasing the pressure on the inflamed bone. At different times and in different cases one condition, and the consequent indication for treatment, may be more prominent than another; they all, however, need to be borne in mind, and rational treatment consists in thoroughly meeting the indications as they appear. The methods for this purpose will vary according to the experience and skill of the surgeon and the surroundings of the patient, and it is a matter of judgment in each case how far absolute immobilization and thorough extension are demanded, when natural muscular fixation suffices, and when exercise is necessary. The greatest damage is from destructive change of the bone, and not from the synovitis, and hence jar upon the inflamed tissues, when caused either by locomotion or by muscular spasm, is especially to be avoided, and this must be done until recovery has so far taken place that there is no possibility of relapse. This requires a long time, during a large part of which motion may not be injurious. The stage when jar must be prevented is longer than the stage when rest is required.

“ To state the matter briefly, beside the necessity of improving the patient’s general condition, it is important:

“ 1. To prevent jar and injurious motion of the joint.

“ 2. To overcome muscular contraction.

“ 3. To prevent and correct deformity.

“ Extension is to be regarded as a means for overcoming muscular contraction for partial fixation of the joint, and, under certain conditions, for ‘distraction,’ or actual separation of the bones forming the joints.”

Prof. A. J. Steele (of St. Louis) recommends, for the early treatment of hip disease, a splint which is claimed to possess many advantages. He has designated his apparatus the *Stretcher Splint*, as it combines the idea of a light portable bed with that of a firm, efficient hip splint. It consists of an oblong frame, made of iron bar, one-fourth by one inch for small children, one-fourth by one and one-fourth inches for older children. Steel can be substituted for iron if a lighter splint is desired, though it is more expensive. He observed at the Children’s Hospital in Boston that the frames were made of galvanized gas-pipe. He suggested to Dr. Watson, at the time his article above referred to appeared in the *Boston Medical and Surgical Journal*, that gas-pipe could economically and efficiently be used for this purpose. He, however, replied that, so made, the splint could not “be lain upon with comfort;” and, as will be seen

presently, the round sides would not so readily admit of attachments being made for the accessory pieces.

He cuts the bar into four pieces, the ends being welded, or cut square and riveted, the ends overlapping the corners. The required length will be three or four inches additional to the height of the patient, the width one inch more than the measurement across the shoulders.

To prevent rusting, the iron is shellacked or varnished, and afterward wound or wrapped around with a bandage of cotton, or it is simply wrapped with a strip of adhesive plaster. The frame is then covered with canvas, excepting a two- or three-inch space in the centre, tightly laced on the under side, and the two layers sewed together at the ends. The opening for defecation corresponds to the distance from the head of the patient to his anal opening. The additional canvas surface uncovered by the body, below the feet, is required for the extension stirrup and strap. A piece of boiler-felt about five by six inches in size is introduced between the two layers of canvas extending upward from the opening, thus making it soft for the sacrum. The edges of the canvas, both above and below the opening, may be covered with rubber cloth for a few inches to guard against soiling. Traction of the affected limb is made with adhesive strips in the usual way, the cord from the centre of stirrup block being attached to an upright steel piece slide on the lower end of the frame, of such height

that extension can be made with the limb elevated, *i. e.*, in the direction in which it finds itself with the lumbar curve obliterated. Counter-extension is made through two perineal straps attached above to a steel arm arching over the hips from the affected side and firmly secured to the side bar of the stretcher. These straps pass down through the central opening, and upward over the canvas, and outward folding over the top of the stretcher to be pinned or sewed to the canvas. The only other attachments are shoulder straps with connecting webbing, sewed on either side of the canvas, not drawn tight, but sufficiently firm to prevent the little patient from rising. When found necessary, as with very restless patients, another attachment may be made of a metal arm springing from the side of the frame and arching over the lower third of the affected thigh.

For convenience of defecation, in the use of the *pot de chambre*, the stretcher is raised from the bed and under it are placed two rests, chairs, each made by bending a piece of bar-iron to the requisite height and length, secured below to a thin board. In using the chairs one is placed under the lower end of the stretcher first, that under the upper end last. The foot of the frame is first raised, that the extension of the limb be not interrupted. This apparatus—stretcher and attachments—need not cost more than from five to ten dollars.

The stretcher-splint being ready, the patient is

transferred to it, the counter-forces, perineal straps and extension, being so nicely adjusted that the anal outlet corresponds to the canvas-opening—at its upper part. The shoulder straps are now sewed to the canvas—not, however, drawn tight. He has had patients, especially among the younger children, who manifested no desire to sit up, and thus on whom the shoulder and chest straps were almost superfluous. A small feather pillow is placed under the head and fastened to the canvas by thread or pin. A muslin cover placed over the canvas insures its cleanliness, or a quilted cover tied down on it additionally gives softness. The steel attachments are covered with chamois or red flannel; children are fond of bright colors, so additionally the perineal and shoulder straps may be covered with red. And, too, he prefers flannel as a material for bandaging the limb; it is elastic, it is warm, and again the red color is not objectionable. For perineal straps he uses a boot strap webbing, so folded, with a strip within to stiffen, as to be three-fourths of an inch or more wide, covered with chamois or Canton flannel; in case of girl patients or where there is danger of soiling, a covering of rubber cloth is well. Cleanliness and a free use of powder prevent chafing. Two perineal straps are better than one, in that they fix the pelvis more securely, besides preventing adduction of the limb and permitting its rectification when it has occurred.

A small pad is placed under the lower third of

the leg to prevent undue and painful pressure of the heel. There is a natural tendency to eversion of the foot, so extreme that at times it lies wholly on its outer side. To counteract this he has found small sand bags properly arranged around the foot and leg better than anything else. It is important too that the weight of the bed-clothes be taken off the foot, either by a hooped arch or by a high steel foot upright. The top of this latter may be bent forward like a crane or inverted L thus overhanging the foot.

If holes are to be made in the canvas for the passage of screws for the attachment of the accessory pieces, it is best done by burning with a red-hot wire or awl. It will be observed that these accessory attachments have not disturbed the integrity of the iron frame; no holes have been bored into it which would weaken it, thus the strength is retained, and though if supported only at the ends it may bend slightly, yet it never breaks or becomes permanently bent.

He states that it is interesting to note how rapidly the tension of the foot and perineal straps may be lessened; as the joint irritation diminishes the reflex muscular contractions relax, so that very soon only a slight force is required to keep the limb extended. He has even loosened the perineal straps without injury.

How long *may* and *should* patients be confined to the stretcher? They *may* be confined without detriment until entire cure is effected. He has had pa-

tients thus in recumbency for over eight months, cases that he did not see early, and that were attended with long suppuration, but who to-day are walking with only a slight limp.

They *should* be confined until the active disease is arrested, until the acute stage is well over. If seen early, and the constitutional taint is not too strongly marked, three months may suffice, more often four. The absence of pain and fever, the quiet sleep, the increased appetite and flesh, the playfulness, all indicate subsidence of local irritation. The charge has been made that this increase of flesh "is the fat of inertia," and therefore not healthful or commendable. To this he would say, that it is a pretty good sign when a patient with general or local tuberculosis increases in flesh, with the appetite maintained, and the normal functions of the body healthily performed. He has never known a patient to suffer injuriously from the recumbency, and has known of but two deaths where the stretcher had been used—one of tubercular meningitis in which the patient was apparently progressing well and without abscess, but in whom the hereditary constitutional taint was very strong; the other was complicated with tubercular involvement of the kidneys and other organs. It was double coxalgia, the opposite hip having been diseased the year previous. The patient's older brother had died of Pott's disease. The tubercular cachexia was apparently too marked and too general to be

thrown off; besides, the disease had advanced far, under improper treatment, previous to the case falling into our hands. Children bear confinement well, because so short a time has elapsed since, as infants, they were lying all the time.

He claims that abscesses are less likely to form by this method of treatment, as the local irritation is so rapidly checked, or, if found, they are readily and more satisfactorily treated than when the patients are up and about; the quiet insures no disturbance of the dressings, and less fear of downward burrowing.

Dr. A. M. Phelps, of New York, in a paper read before the New York State Medical Society, 1889, introduced a portable frame devised by him, of which the following is a description. (See fig. 7).

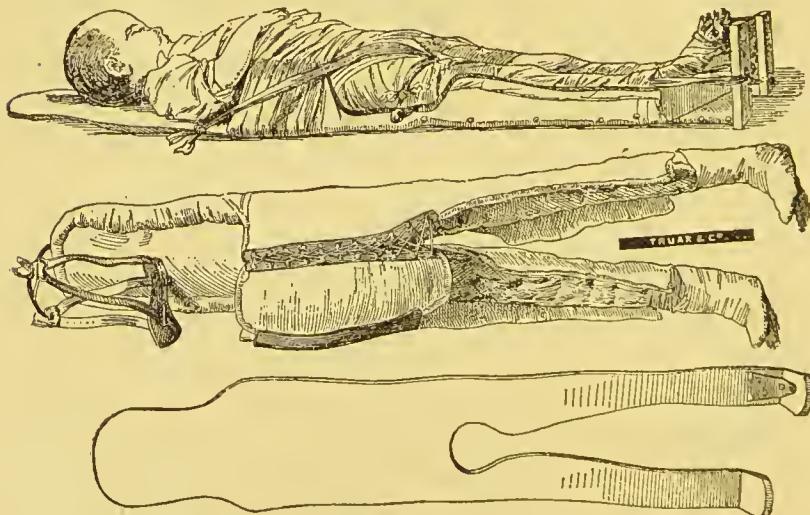


Fig. 7.—Dr. A. M. Phelps' Portable Hip-Joint Frame.

“A board is cut to correspond to the length and width of the child. This is carefully padded. The child is now laid on the board and enveloped with a plaster-of-Paris bandage from the feet to the axilla to a thickness of three-eighths of an inch. When the plaster is set, the front is cut away. This bed can now be lined and a front put on it and lacings put in, or the child can be held in place by means of bandages. As the plaster bandages are rolled on, they should be nailed to the edges of the board, thus making the board and plaster one. This bed will be found to fit better, be much lighter, and more convenient to make than the wood cuirass. Extension is made to the foot-piece, and lateral extension by cutting away the side a little and putting in a staple, to which the bandage is tied. The portable bed possesses nothing superior to the wire cuirass to recommend it, only its cheapness, costing as it does about three dollars; and then a skilled mechanic is not required—any practitioner would be equal to the task. This will enable the mother or nurse to carry the child about, and the hip-joint is perfectly immobilized by fixation and extension applied in the proper lines.”

BED TREATMENT BY BUCK'S EXTENSION (SEE FIG. 11).

Prof. L. A. Sayre's directions for making extension while the patient lies upon an ordinary bed are so complete that they are here reproduced with but little alteration.

For making extension during the night, and also at other times when it is expedient for the patient to lie in bed, this is best effected by means of weight and pulley. To apply it, cut two strips of strong adhesive plaster, two or three inches wide, according to the size of the patient's leg, and long enough to reach from the malleoli to six or seven inches above the condyles of the femur. To the lower end of each strip sew a piece of strong webbing, three or four inches long (see Fig. 8).

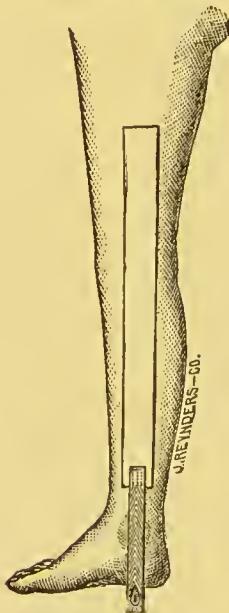


FIG. 8.

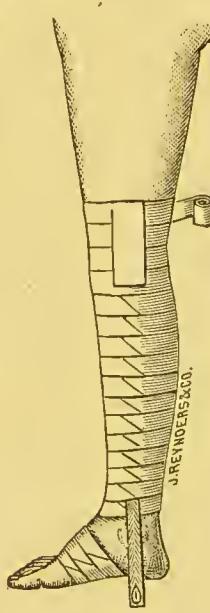


FIG. 9.

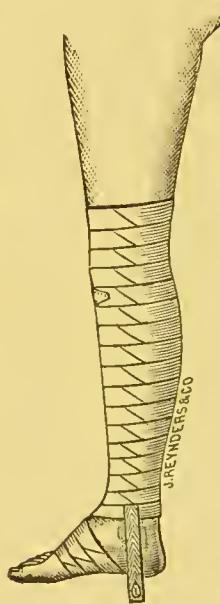


FIG. 10.

After smoothly bandaging the foot and ankle, apply the ends to which the tabs are attached, one

just above either malleolus, and carry the strips of plaster up the inner and outer sides of the leg and thigh, and secure them with a roller, nicking the edges of the plasters to make them fit smoothly, and prevent any folding or creasing.

The proper method of fastening the plasters to the limb is to allow them to hang loose along the sides, and bring them in contact with it by the successive turns of the roller, for in this way you will be much less liable to wrinkle them, and that is an important item. This may appear like an insignificant matter, and hardly worthy of special mention; but it is not, for a single wrinkle in the adhesive plaster may, by the irritation it will produce, defeat the whole plan of treatment.

The tabs should receive a few extra turns of the roller, over one and under the other, shoving them in, for the purpose of making them additionally secure.

When the knee is reached by the roller, *always* cover it in with the figure-of-8 turn, for the edge of a reverse turn in the bandage at this place may give rise to serious inconvenience, and necessitate its entire removal. When the bandage has been carried two or three inches above the condyles, the remaining portions of the plasters are to be reversed (see Fig. *B*), and then a few more turns of the roller will, by the bandage adhering to the plaster, fix the dressing so that it will not easily slip (see Fig. 10).

The plaster should be applied cold, but when the

bandage has been applied, the plaster should be moulded to the limb, by firmly squeezing it with the hands. It is also very important to secure the plaster above the condyles of the femur, in order that extension may be made upon the thigh, and *not upon the lateral ligaments of the knee-joint.*

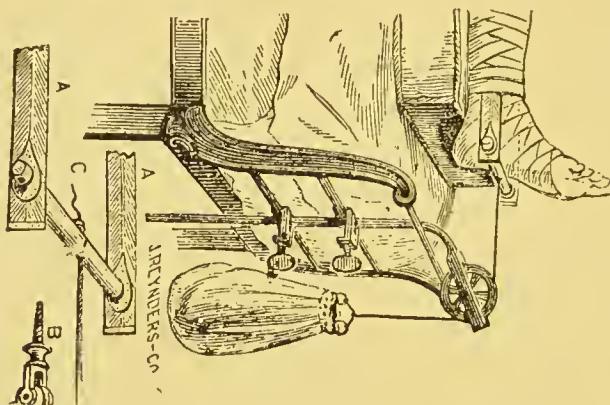


FIG. II.

The bandage should then be fastened, and with stitches, for it is to remain a long time.

If the limb is held in the proper position, namely, in the line of the deformity, and gentle extension maintained by an assistant, it can be prepared for the bed extension and the splint without giving the patient the slightest pain.

Next take a round piece of wood, three or four inches long (Fig. 12), having a hole drilled through the centre for the attachment of the cord, and a

groove cut on each extremity to hold it in place, where it is buttoned into button-holes (Fig. 12), made in the lower part of the taps, attached to the strips of adhesive plaster, already fastened to the sides of the limb. To the middle of this round stick is attached a stout cord. The object of the stick is simply to prevent the hands from making an uncomfortable pressure upon the malleoli. At the foot of the bed a pulley (Fig. 11) is to be arranged in such a manner as the ingenuity of the surgeon dictates, the cord from the stick placed upon it and a weight attached, just sufficient to make such extension as will render the patient comfortable. For a weight a bag of shot or sand is most convenient, because the amount can then be easily regulated.

To prevent the patient from slipping down in the bed, its foot end should be raised ten or twelve inches by means of bricks or blocks.

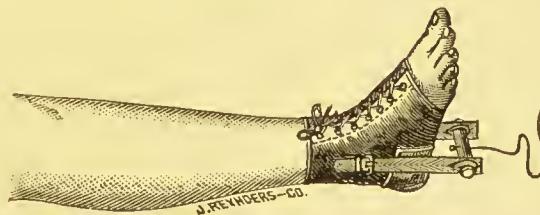


FIG. 12.

In some cases Dr. Sayre employs for night extension a firmly made satin jean anklet, as per Fig. 12, this laces over the instep and a heavy buckskin tongue. Secured to this anklet on each side are buckles, into

which are fastened the tabs holding in button holes the wooden cross piece.

Dr. J. E. Moore, of Minneapolis, Minn., holds the opinion that when the disease is recognized at an early date the joint should be put at rest at once by some one of the various means at our command. By rest he means that all motion in the joint should be stopped, and that it should not bear any part of the weight of the body. Unfortunately, in the majority of cases some deformity has already taken place when the case comes under the care of the surgeon. Under these circumstances the deformity should first be overcome. This can be accomplished best, he affirms, by means of a weight and pulley. When great pain exists with deformity, nothing is so efficient as traction, and this he considers is best applied by means of a weight and pulley. His only objection to this means of treatment is the necessity of confining the patient to bed. He only advocates this treatment for a short time until the pain has been relieved, and the deformity overcome as much as may be. A few days are often sufficient, and the time should never extend beyond six weeks. He has many times seen a living skeleton changed into a fat, healthy child by this means.

Theoretically, the traction should be in the line of the deformity, but practically he finds that it is unnecessary to make special provision for this, as the child inadvertently changes its position so as to meet

this indication. The weight should be from one to five pounds, according to the weight of the child. It is not so much the size of the weight as it is the continuous traction that overcomes the contraction of the muscles and relieves pain. It should be suspended from a pulley at the foot of the bed, and should be attached to the limb by means of adhesive plaster extending well above the knee. When the pain is very severe, applications of moist heat to the joint are a great source of comfort. When a surgeon puts a child in bed with a weight and pulley attachment, he should aim to make the little one's stay there as short as possible. As soon as the pain is relieved, the deformity overcome, and the extreme sensitiveness of the joint has disappeared, some form of fixation apparatus should be applied and the child allowed to go about.

DIVISION NO. 4.

D. APPARATUS PERMITTING LOCOMOTION.

(a) *Apparatus for the production of fixation without traction.*

I. Moulds of plaster-of-Paris, starch, silicate of soda, etc.

It is not necessary for us to devote space to describe the details of applying these fixation splints, as they are well known to every practitioner. The chief advantage possessed by them is that of cheapness, and when used in connection with the high shoe and crutches they often produce good results if the dis-

ease be not too active, provided that the moulds are caused to extend from the knee to the axillæ. (See Fig. 13.) As a method of treatment, this practice of

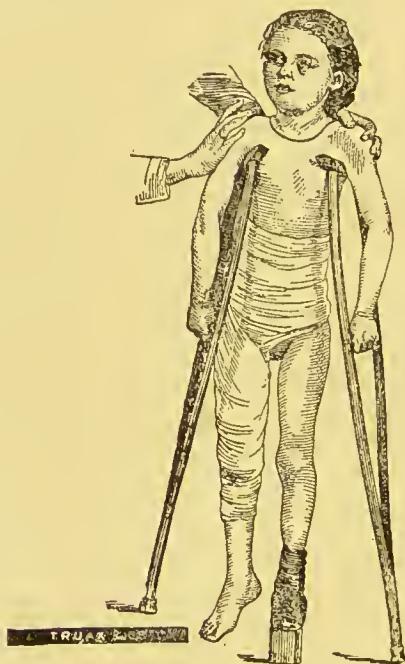


FIG. 13. (After Bradford and Lovett.)

encasing the limb and trunk in an immovable plaster splint has many advocates.

A wire hip splint is also largely used, of which Hamilton's is a good example, but as none of this class of fixation splints possess facilities for producing extension, or even good fixation of the joint, they do

not find favor in the eyes of orthopœdists when better apparatus can be obtained.

2. Bouvier.*

The splint of this distinguished surgeon was composed of leather, and was reinforced by steel strips. It extended (see Fig. 14) from the thorax to the knee, and was fastened by lacings. It was sufficiently firm

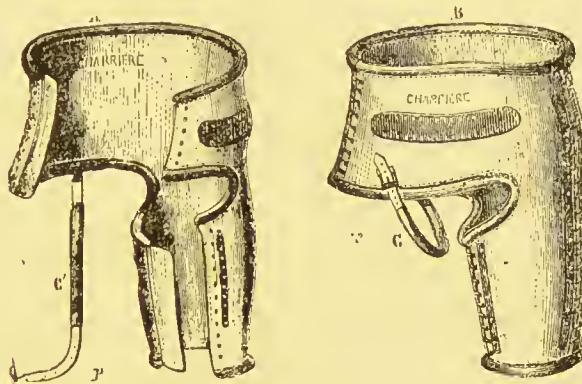


FIG. 14. Bouvier's Leather Hip-Splint.

to be unalterable in shape, and it was claimed for it as an advantage that it could be removed and replaced at will.

Among the objections urged by French writers against this splint,† was the great difficulty in obtain-

* Bouvier—*Bulletin de l'Academie de Médecine*, 1866, xxxi, p. 421.

† *Arsenal de la Chirurgie Contemporaine* (Gaugeot et Spillmann), Paris, 1867, p. 359.

ing an exact coaptation of the leather to the surface of the body, without which it was considered ineffectual. A plaster cast was considered necessary to produce a properly fitting splint, but its formation was attended with so many difficulties, in acute cases especially, and entailed so much suffering and fatigue for the patient, that the splint did not meet with general favor.

3. Dr. A. M. Vance (of Louisville, Ky.) employs a fixation splint made of leather (see Fig. 15), and with

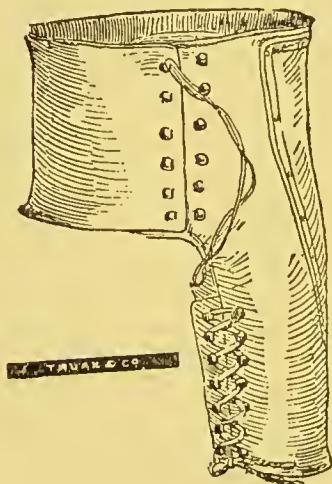


FIG. 15. Vance's Leather Hip-Splint. (Bradford and Lovett.)

soft paper takes a pattern of the sound hip in the position in which it is desirable to fix the diseased one

The leather is immersed in very hot water long

enough to make it thoroughly pliable, and then moulded about the pelvis and thigh, securing it with a roller. In about twenty minutes it will be sufficiently hard to admit of removal without losing its shape, during which time the position of the limb should be secured by weight and pulley. (Gibney.)*

Fig. 16 shows the form of the leather splint before it is moulded to the hip. The edges are pared down after it has become firm, the gusseted portion is properly riveted, and the hooks and tongs are attached.

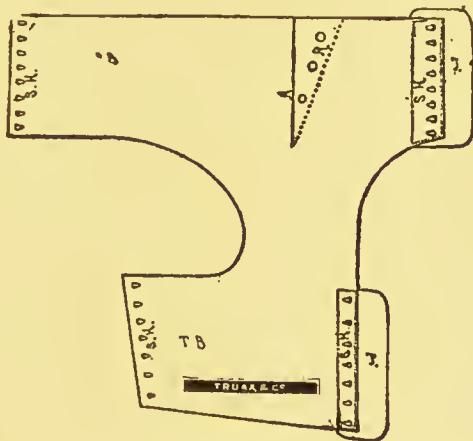


FIG. 16. The same before application. (Gibney.)

To guard against excoriation, or undue pressure over prominent portions, *fenestræ* are cut, and if the

* Diseases of the Hip, Gibney, p. 346.

tendency to deformity is great, a strip of steel can be riveted in front.

In case abscess forms, openings in the leather are made when required.

If it be desirable to change the position of the limb, the splint can be immersed again in hot water, and reset as before.

4. THE THOMAS TREATMENT.

Mr. Hugh Owen Thomas,* of Liverpool, has originated a method of treatment which has been adopted by Profs. Bauer, Ridlon, and others among the leading orthopœdists of this country, owing to its simplicity and the ease with which it is managed by general surgeons, and it is almost impossible for any other than the surgeon in charge to interfere with the proper working of the instrument during the intervals of observation.

The object of this method is to secure fixation of the hip without extension, except so far as the use of the high shoe and crutches produces traction.

In the preparation of the splint, which is so simple that it can be readily made by any surgeon, the following directions are to be observed:

The patient is to stand with the foot of the diseased side raised either on books or some other elevated pedestal, until the spine assumes a normal curva-

* His claim for priority is disputed by A. M. Phelps, of New York, and by Blanchard, of Chicago.

ture. Then a long flat piece of malleable iron, one inch by one-quarter of an inch for an adult, three-quarters of an inch to three-sixteenths of an inch for a child, and long enough to extend from the lower angle of the scapula to the lower border of the calf of the leg, is to be taken and bent by wrenches to the form of the body. A hoop iron thoracic belt, one-half of an inch by one-eighth of an inch, is to be fixed to the top of the rod, and a hoop iron thigh belt, three-quarters of an inch by one-eighth of an inch, is to be attached to this, one or two inches below the fold of the buttock. Another similar piece, equal to half the circumference of the calf, is to be placed at the lower extremity of the rod. The part on the diseased side is not to touch the side of the thorax, but has to fit closely, and in case both hip joints are diseased, the apparatus should be made double.

A set of wrenches, with which to shape the iron bars, should also be provided, and by them the long iron bar should be moulded along the posterior surface of the limb so as to accurately adjust itself to it. The lumbar portion of this upright should be a plain surface. The chest bands should be elevated to the top of the upright bar at a point one-third of its length, measuring from the end corresponding with the diseased side, and its shape will be oval to prevent the splint from rotating on the body.

The instrument should be padded and covered either with felt or with leather, which can be done by a saddler, with very little trouble.

The upper or chest crescent should be secured to the body by a strap and buckle, and suspenders are to be used over the shoulders.

The lumbar portion is to be secured by a common roller bandage and also the limb portion in the same manner.

The use of the wrenches is necessary to correct the rotation of the limb, and also the abduction and adduction.

The uprights must have a rotation outwards and pass to the inner side of the popliteal space. This will prevent rotation inwards of the limb.

Should the instrument rotate towards the diseased side, and so become a side splint, the surgeon should contract the longest wing of the upper crest and extend the short one, or if the instrument does not rotate, yet, if the stem is not over the prominence of the buttock and well behind the thigh, then the upright requires more twisting with the wrenches, or if the trunk portion of the upright threatens to ulcerate the skin, the angle at the hip should be diminished.

During the acute stage the patient should be kept in bed, but after this, he should be allowed to go about on the crutches, with the apparatus still upon the limb and a raised shoe from the other side, until the limb is well atrophied around the great trochanter, the outline of which should be more discernible than that of the sound side.

In the third stage of treatment, the apparatus is to be used alone, and it is the province of the wrenches to alter the instrument until the limb is brought back towards the normal lines. An earnest advocate of this method, Dr. John Ridlon, of New York, asserts that "any man who can drill a hole and drive a rivet can make a Thomas splint; and the only instrument-maker any one needs is the blacksmith and the shoemaker." The cost of the splint thus constructed he states should not exceed \$2.50.

Fig. 17.—Thomas' hip splint, not yet padded and covered. Note the two holes at the bottom where the "nurse" may be screwed on.



Fig. 17.

Dr. Ridlon describes it as consisting "of a stem and three bands. It is made of soft iron; steel will not do, being too stiff and elastic to be readily moulded to the patient and remain rigid when once fitted. For a child from five to ten years old, the stem should be of soft bar iron $\frac{3}{4} \times \frac{3}{16}$ inches; the bands should be of hoop iron; the chest band $1\frac{1}{4} \times \frac{1}{16}$ inches and the thigh bands $\frac{3}{4} \times \frac{1}{16}$ inches. The stem must reach from the lower angle of the scapula to the junction of the middle and lower third of the leg. At the point where it passes the buttocks, a double bend is made so that the

upper and lower portions follow parallel lines from two to three inches apart, the lower portion being the advanced portion. The stouter the patient the less should be this bend. The chest band is to be from two-thirds to three-fourths of the circumference of the chest, at a level with the lower angle of the scapula, and joined to the upper end of the stem and one-third on the other, it will bring the junction of the stem and band at about the desired point. In each end of this band there should be a hole sufficiently large to admit a bandage, which fastens the end together and supports the splint by passing over the shoulders to the stem at the back. The thigh band is two-thirds of the full circumference of the thigh, and should be within an inch or two of the perineum; this is usually just at the lower bend of the stem. Two-thirds of the band should be to the inner, and one-third to the outer side of the stem. The leg band, which is joined to the lower end of the stem, is two-thirds of the circumference of the leg at the junction of the middle and lower third; two-thirds of the band is to the inner, and one-third to the outer, side of the stem. In the lower end of the stem there should be two screw holes, to which can be screwed a piece of bar iron, called a "nurse." The object of this is to render it impossible for the child to walk during the period that it is desired to confine him to bed. The surfaces of the stem and bands next the patient are padded with one thickness of No. 1 boiler-

felt and the whole then covered with basil leather. This is best put on wet, so that when dry the cover will not slip on the iron."

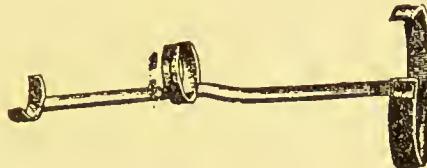


FIG. 18.

Fig. 18.—Thomas' hip splint, padded on the inner surface, and covered with sheep-skin.



FIG. 19.

Fig. 19.—The "nurse." This may be screwed on at the bottom of the splint when it is desired to keep the child from walking.

"Before the splint is applied a twist is made in the stem in its longitudinal axis between the thigh and body bands, so that the thigh and leg portion shall lie somewhat nearer to the median line than the body portion, and so that the upper portion shall lie flatly against the barrel-shaped chest." In all the illustrations, in the various publications that have come to Dr. Ridlon's notice, of Thomas' splint applied, the chest band is joined, and the splint supported, by webbing bands. He, however, found Mr.

Thomas using a strip of ordinary bandage, looping it around the upper part of the stem, twisting the ends together for from four to six inches, so that they will separate high up on the back, then carrying one over each shoulder to the holes in the ends of the chest band, making a firm knot at each hole, and then joining the holes by the ends of the bandage and again making firm knots. All knots were further secured by passing through each a large pin, twisting and nipping off the end so that the splint could not be removed without his knowledge. The lower extremity is usually represented as bandaged to the splint from the ankle to the upper thigh. In place of that, he found that Mr. Thomas passed a strap of basil leather across the front of the leg close down to the upper border of the patella, thence backward and downward to the stem of the splint, and pinned it to the covering, so that any downward working of the splint would be brought to bear on the quadriceps femoris. It seems to him that this arrangement has much to do with overcoming and preventing flexion of the thigh. Where, however, there is much pain from involuntary muscular spasm, and the patient is still in bed, he has been accustomed to bandage the leg to the splint. In some cases the splint will have a tendency to shift more or less to one side. This is corrected by opening out the wings of the bands on the side towards which the splint has shifted, and drawing in those on the side opposite.

A mistake which he made before seeing Mr. Thomas at his work, and which he thinks has been generally made in this country if not also in England, is in considering the splint as essentially a walking splint; of not applying it until flexion had been overcome by other means, and of allowing the patient to get up and walk as soon as the deformity had been overcome, as is usually done with the various traction splints. The splint is more serviceable as a bed-splint than as a portative apparatus; it should be applied as soon as possible without using other means to overcome flexion (in most, perhaps in all, cases); and the patient should be kept off his feet, in the horizontal position—not necessarily in bed, however—until all involuntary (or reflex) muscular spasm has subsided. Then a patten is attached to the shoe on the well side, he is given crutches, and allowed to walk around.

This patten, which looks as if it would prove a veritable stumbling-block, causes the doctor more trepidation than the patient. It must be from four to six inches high, so that the toe cannot reach to the ground when walking with the crutches, and so that walking without crutches is impossible. The patient under no circumstances is well established, if the best possible results are to be attained. There must be no movement at the joint. The physician himself must restrain his curiosity and not at every visit remove the splint and "test the joint" to see how much motion

there may be. If he manipulates the joint every week or two, he will surely prolong the disease, and very likely induce ankylosis where he might have had more or less motion.



Fig. 20. Thomas' splint applied with patten and crutches (after Robert Jones). (Reduced from Ridlon).

When the patient is believed to be cured, the patten may be removed and the crutches thrown away, but the splint should be continued for some months. If there be no return of symptoms, Ridlon directs that

it may then be shortened so as not to extend below the knee, and knee motion be thus allowed. It should be worn thus for several months more before it is finally removed.



FIG 21. Thomas' Wrench for bending the splint, modified from Moore's triple-action ratchet-drill, and made by the Lowell Wrench Co., of Worcester, Mass. (Ridlon.)



FIG. 22. The ordinary Wrench for Bending Splints.

In neglected cases, where the thigh has become flexed to such a degree that the splint, as described, cannot be applied, Ridlon directs that one of two courses may be pursued: Either the deformity may be sufficiently overcome under an anæsthetic to admit of the application of the splint; or the splint may be bent to meet the deformity, and then gradually straightened. He states that he has several times anæsthetized and reduced the deformity without any evil result, but has been careful to manipulate the joint with the utmost gentleness, and no more than absolutely necessary, and then has immediately immobilized the joint. So far he has not had any in-

crease in pain, and in one case there was immediate relief, which he had been unable to secure by traction either in the line of the shaft of the femur, or in the line of the neck and the shaft both (as advised by Phelps). But Mr. Thomas* advises reduction of the deformity by bending the stem of the splint at a point opposite the sacrum, and straightening rapidly (three or four days) by leverage, using sufficient morphine to relieve any increase of pain.

5. DR. DE F. WILLARD'S TREATMENT.

A fixation splint provided with a joint at the hip, a description of which is to be found in the *Transactions of the American Medical Association*, 1880, has been devised by Dr. DeForest Willard, of Philadelphia.

He describes it as follows:

“It consists of a steel joint, which can be locked and unlocked at pleasure, thus rendering the hip perfectly fixed until just at the moment of sitting, when by lifting the bolt (which can be easily done through either a gentleman's or lady's clothing), a perfectly movable joint is secured.”

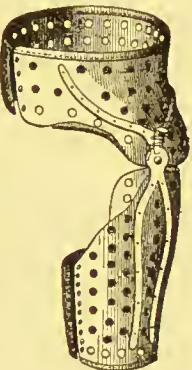
The method of constructing this apparatus is: First, to make a mould, by plaster-of-Paris bandages, of the body as high as the sixth dorsal ver-

* Dr. Ridlon's explanation of this splint is so satisfactory and instructive that it has been mainly used instead of that of Thomas.

tebra behind and the lower limit of the ensiform cartilage in front, in order to secure a firm thoracic support; thence downward, covering in the pelvic region as low behind as the commencement of the

internatal crease, and in front to the summit of the pubis; thence over hip, buttock, and thigh, to a point about three inches above the knee joint. This mould can be best taken over a light pair of bathing or closely-fitting drawers. When thoroughly hardened, it is to be slit up, removed, and from it can be made a plaster cast which will be the exact shape of the individual to be fitted, every point and irregularity being represented.

FIG. 23. Dr. Willard's Splint.



Upon this cast, wet leather is stretched, and rubbed and worked until it exactly conforms itself to the surface, when it is allowed to dry *in situ*, the result being a perfect fit.

This leather is so tanned that, while it is exceedingly light, it is perfectly hard and tough, being much better than sole-leather or raw-hide.

When thoroughly dry, the body and thigh portions are separated, and connected by a joint attached to two spreading steel arms, as seen in the drawing.

This joint must be a strong one, and should be made double, *i. e.*, not with a single rivet, but by the same process as is employed in artificial limbs.

In the lower section is a mortise or slot, into which fits a bolt, worked (through the clothing) by a head, and thus perfect fixation is secured.

This bolt slides easily through eyelets, and is retained in its place when lifted by a spring, pressing like a finger against its side. The unlocking can be done in a second, during the act of sitting down. The whole splint is perfectly simple, and can hardly get out of order. It is laced down the front of the abdomen and thigh. The steel thigh-pieces could be united into one and continued down to the shoe; but even though this be done, the enveloping thigh-band should be considered as one of the essentials for fixation.

The numerous perforations render the apparatus lighter, and give vent to exhalations; the total weight of the splint for a man of 200 lbs. is but 45 ounces. The joint allows only the hinge motion, which is of decided advantage in twists and lacerations, and also in hip disease when the round ligament is involved, as rotary and lateral motions would tend to prevent repair. To render the apparatus comfortable, it is necessary to cut away certain portions after the patient has worn it, especially the part in front beneath the ribs and above the groin. The edges can be padded with curled hair, and greater ease is obtained by taking its weight off the hips by means of suspenders worn over the shoulders. When locked, it is surprising how the weight of the body is transferred to

the thigh through the medium of the steel, without any strain on the hip joint. This splint he uses in connection with the plan of crutches, and a high shoe upon the sound foot.

6. MR. E. J. CHANCE'S TREATMENT (OF LONDON).

This is described as follows by Mr. E. Noble Smith, who states "that the principles upon which this treatment is based, the almost immediate relief from pain after the splint is applied, and, above all, the good results ultimately obtained, have convinced him of the excellence of Mr. Chance's plan of treatment." The chief objects of treatment are:

1. To subdue inflammation.
2. To restore free movement.

The most important indication is rest to the inflamed joint, which eases the pain. The best means for obtaining rest are: (1) The prone couch. (2) The mechanical instrument. Upon the prone couch the patient reclines in a position of perfect rest to the diseased joint. He can move his arms and body. He can play, read, work, and eat easily, and without disturbing the joint; whereas, in a supine position on an ordinary bed, few of these advantages are enjoyed. The mechanical instrument is constructed and used upon the principles of fixing the joint in the position assumed by the disease, and of moving it day by day, and by small degrees, towards a normal position.

Fig. 24 represents the principles of Mr. Chance's apparatus.

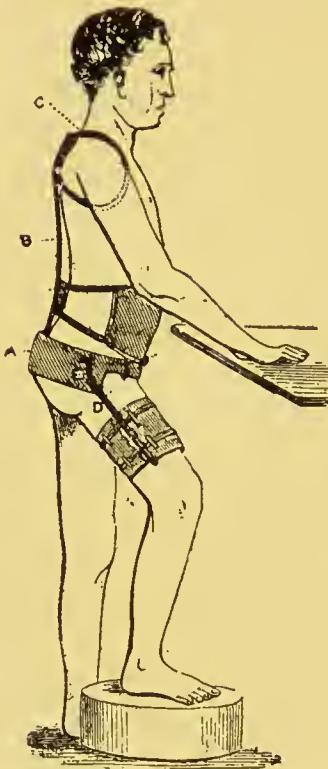


Fig 24—The "Chance" splint

The instrument is constructed as follows: A pelvis belt, A, is adapted below the iliac crests. An upright bar, B, passes from this belt to the height of the shoulders, and terminates in a pad. From this pad proceed straps, C, forming armlets, or shoulder

straps. From the pelvic belt proceeds a stem, D, which is fixed by a leather casing to the thigh, and the stem is movable by means of rack joints, E, in the directions both of flexion and extension, as well as abduction and adduction.

In applying the instrument the inclination of the joints should be adapted to the position in which the limb is held by the patient, and the apparatus must then be buckled on with as little disturbance of the joint as possible.

If this be done carefully the joint is immediately rested, and pain ceases at once, or very soon.

The next important indication in the treatment is to effect a gradual *redressement*, by moving the joint day by day, so as to bring the leg by degrees into a straight and extended position and to prevent ankylosis.

These movements require great care; they must always be made by the surgeon himself, and should always be stopped short of leaving the joint in a position which gives the patient pain.

As this adaptation proceeds, slight alterations in the straps, or other parts of the instrument, will generally be necessary, and the care and ingenuity of the surgeon will be called for to meet the requirements of individual cases. It will be to the advantage of the patient if the instrument and the couch be both employed, and under no circumstances should he be allowed to walk about.

Cases seen in very early stages of the disease may be treated by the couch alone, hot water fomentations and turpentine liniment being also employed.

In dealing with cases in which the disease is so far advanced when they come under treatment that ankylosis is a necessary result of cessation of the disease, the surgeon should endeavor to place the leg in a slightly bent position, that being probably a better one for all purposes than if the legs were fixed in a straight line. Some surgeons, however, consider that a straight position is the best.

When the patient has so far improved that the surgeon considers he may be allowed to leave the couch and get about, the side bar of the instrument is to be extended to the ground and attached to the sole of the boot, having a cog-wheel joint at the knee and a front stop-joint at the ankle. By this means the weight of the trunk is transmitted directly to the ground, and the hip is relieved from pressure, thus dispensing with crutches, which are necessary in Thomas' treatment of this stage.

(b.) FIXATION WITH LINEAR SPINAL TRACTION (VERTICAL). BERNARD BARTOW'S TREATMENT.

Dr. Bernard Bartow, of Buffalo, has devised a plan of treatment which is unique, and embodies a new idea touching the management of the mal-position of the limb that is due to reflex muscular contraction. It also possesses advantages in

the matter of fixation of the inflamed joint, by securing a more extensive hold upon remote parts, whose functional exercise tends to induce movement in the hip joint. In addition to the latter, it is attempted by this plan to supplement the quality of fixation which the apparatus maintains by utilizing the immobility of the inflamed joint which depends on reflex muscular spasm.

The plan consists essentially *in having the patient suspend himself by the head*, in the manner required for the application of the plaster-of-Paris jacket in spondylitis. During this operation the foot of the well limb is made to rest on a block, from four to six inches in height, so that the affected limb will, by its own weight, exert traction upon the muscles about the hip joint.

The trunk and limb, having been encased in stockinet, should then be wrapped with cotton wadding bandages, to protect the surface, from the sixth or seventh rib to the middle of the leg. Over this dressing plaster-of-Paris bandages should be applied in a manner to include the trunk, hip, and limb within the limits indicated. Three strips of malleable steel should be bent to conform to the contour of the body and limb, and inserted between the bandages on the anterior, lateral, and posterior parts of the dressing. As soon as the dressing has become hard it should be trimmed out on the inner side of the thigh, where it passes under the perineum, and all of the

edges smoothed to prevent chafing of the skin. A high shoe and crutches having been provided, the patient may be taught their use with the least possible delay.

The splint thus formed will hold the hip joint in an immovable manner. It will possess sufficient strength to permit of the patient being lifted or carried without causing pain, or the fear of painful movement of the joint.

He states that the degree of correction in the malposition, thus obtained, could be immediately secured by the re-application of the dressing, and that the repetition of this process at intervals of four or six weeks would further lessen the amount of malposition, so that when three or four dressings had been applied, there would be no greater degree of flexion than is commonly found soon after a portative splint has been put on, following a course of traction treatment for the correction of deformity, while the patient has been saved the tedious experience of confinement incident to the latter plan, and has had the opportunity from the beginning of treatment, to acquire physical vigor by exercise in the open air.

Those cases in which retrogression of the morbid process promises a partial restoration of movement in the joint, he claims are not hindered by this method, in the re-establishment of this function in a greater measure than follows treatment by traction. On the other hand, when ankylosis is the probable outcome

of the disturbance he considers the angle of flexion is no greater than is necessary for the best usefulness of the impaired limb. Turning to account the reflex muscular contraction, he is of the opinion that this assists in the fixation of the joint, and greatly augments the control that may be exercised over movement in the joint. So efficient in his experience has been this plan in giving relief from painful spasms of the muscles, that he no longer regards traction as necessary for that purpose, or even desirable in comparison with the plan suggested. The efficacy of the splint depends, in a large degree, on the extent of the grasp it maintains on the parts above and below the hip-joint. No discomfort has been observed to follow encasing the trunk in the bandage, except the patients are not able to ingest the usual quantity of food at the regular hours for meals. This is easily overcome by directing them to take food at shorter intervals. The splint permits the patient to rest in a partially sitting position, by leaning on the buttock of the well side against the edge of a sofa or chair, the body and the affected limb meanwhile being held in an oblique position.

When the malposition has undergone a considerable degree of reduction, or when it is probable that the residue will be permanent, through ankylosis supervening, he recommends that a removable splint then be made of strong leather, moulding the leather into the desired shape by stretching it upon a plaster-

of-Paris cast made by removing the plaster-of-Paris splint and utilizing it for a mould. Such a splint permits of easy removal for purposes of passive movement or other necessary attentions to the welfare of the joint and limb.

Ultimately this splint may be taken off for short periods of time, to enable the patient to test the sensitiveness of the hip-joint by the use of the high shoe and crutches only. In this careful manner the patient may feel the way to his feet, and by heeding the least sign of reflex irritation may escape relapses that would tend to protract recovery.

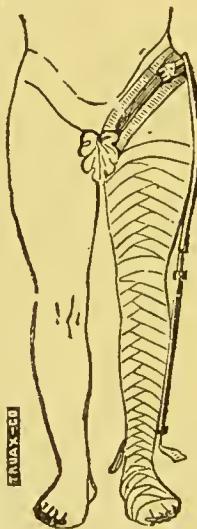


FIG. 25.—The Davis splint.

C. EXTENSION SPLINTS.

1. *Without spinal support, but provided with facilities for motion at the hip.*

(a) *H. G. Davis* (Everett, Mass.).

Dr. Davis was the first to devise and employ the short extension splint provided with a perineal but not a pelvic band, and reaching from the crest of the ilium to the knee, and afterward to the ankle. (See Fig. 25.)

A recent letter of inquiry elicited the following reply:

EVERETT, April 21st, 1891.

DR. STILLMAN:

DEAR SIR:—Your letter of April 3d has just reached me, having been forwarded from Westboro. If you have my work “Conservative Surgery,” you have my views on the treatment of hip disease. My views upon the subject have not changed, my long experience has only confirmed me in their correctness. I do not feel responsible for those cases which I have merely placed under treatment and left in charge of others; but in all those which have remained under my own care the destruction of the joint has been arrested at the first separation of the diseased parts, the patient recovering with full motion of the limb and with no more shortening than existed at the commencement of treatment. I cannot urge too decidedly the necessity of keeping the diseased parts unremittingly separated. This is *the principle* of treatment and is the foundation from which the best results can be expected. As soon as patients can move the limb without suffering I allow them, with the extension splint properly adjusted, to be about on crutches moving the diseased limb as in walking, but not bearing any weight upon it. This motion gives the joint its accustomed exercise, as es-

sential as it is to a healthy joint. But the diseased surfaces must not be allowed to impinge upon each other. If there is any method of treatment that gives better results than this, I have yet to hear of it. Most of the writers upon hip disease whose views have come under my notice appear to be satisfied if the patient recovers with additional shortening and with limited or no motion of the joint. I hope you will claim the treatment as the American method and give me the credit of introducing it some forty years since. You will find in my work a full account of my mode of treatment, which method has proved perfectly successful.

Sincerely yours,

HENRY G. DAVIS, M. D.

B. DR. EDMUND ANDREWS,* OF CHICAGO.

This author at present (1891) holds the following views:

1. The growing opinion that nearly all these cases are tubercular has not changed the fact.
2. The treatment by Koch's lymph is yet under trial, and its final value not settled. If it proves to be anything like what we hope, its use will be one of the most important elements of the treatment, especially in the early stages.
3. Immobilization and extension are both of immense value, and generally cannot be separated with propriety. It is a mistake to select one, and omit the other, except in mild cases.
4. Thomas' splint (which is mainly Blanchard's

* Extracted from letter to the author, dated Feb. 1st, 1891.

with the extension left out, (Blanchard having devised it first) accomplishes immobility very well. Neither that, nor any other splint, effects absolute immobilization, but it comes near enough to it to cure a good portion of the cases.

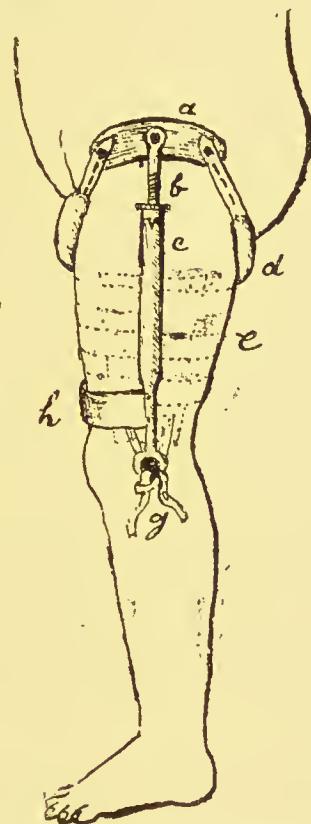


FIG. 26.—Andrews' Hip splint.
(Fac-simile of a sketch made for this work by Dr. Andrews.)

The various hip splints of my devising are all modifications of the principle of the one long ago introduced by Henry G. Davis. I still use them in many cases, for though not originally intended to fix the joint, they practically do it to a considerable extent, merely by the straight pull which they exert.

If the case is severe or proves obstinate though not severe, I often place the patient for a few weeks in bed, seeking immobilization and extension combined either by the weight and pulley acting in the direction most comfortable to the patient, which is often at a high angle, or by a fixation and extension apparatus combined, while the patient goes on crutches.

If caries and suppuration occur, some operation is generally advisable, though drainage and injections of the cream of iodoform in boiled glycerin, or other antiseptics, will cure many if persisted in. An operation should not always be an excision.

The opening at the joint which has not suppurated nor become observably carious, with the view of scraping away all tuberculous tissue and healing it by first intention, makes some good successes, but ought not to be done as long as there is a good prospect of cure by fixation and extension.

C. DR. LOUIS BAUER'S TREATMENT.

Dr. Bauer, of St. Louis, writes as follows:*

* From letter to the Author, dated April 1st, 1891.

“ The primitive symptoms of coxitis are at best changeable and indefinite. Surgeons have but rare opportunities to advise in the first stage of the incipient disease. But if consulted at such juncture it would seem wise to take measures in arresting the mobility of the suspected articulation, particularly when traumatic antecedents are mentioned.

“ On such an occasion it is an easy task to *prevent* the development of coxitis and to silence it at the very start. Moreover, temporary restraint of locomotion at so tender an age can scarcely be looked upon as punishment.

“ If the disease has assumed definite proportions, and its diagnosis is doubtful no longer, the immobilization of the joint in a rectangular position of the affected extremity to the pelvis and recumbency should be insisted on. Whether or not the disease emanates from a traumatic injury, or whether its causes are unknown or supposed to be constitutional, locomotion and the mobility of the implicated articulation should be promptly suspended. For the superincumbent weight of the body and the *constant* employment of an affected joint are in my opinion the main *factors* of propelling the lesion to its disastrous termination.

“ The correctness of the foregoing proposition can be readily demonstrated by immobilizing the joint, being invariably attended by prompt relief of pain, and under favorable circumstances by its complete

abrogation of the disease. And that is more than can be said of any hypnotic.

“If the symptoms denote the advance to the second stage pain on pressure and motion (inflammatory) and nocturnal pain (by reflex action), apparent elongation, abduction and eversion of the extremity (from hydraulic pressure within the joint), and tetanic rigidity of abductor and flexor muscles; last and not least, when fluctuation can be discovered along the posterior contours of the joint itself, *then the subcutaneous opening of the joint becomes imperative* for the realization of two objects, the *relief of unbearable suffering* of the patient and the correction of the prevailing malposition. If it is yet possible to immobilize the joint at the same time, keeping the extremity in proper position by suitable means and care, *contentment of the patient* may be safely expected. If, however, the aforesigned group of muscles are already contractured, and do not even relax under a strong chloroform anaesthesia and effectually oppose the reduction of the extremity to a normal position, I could advise no safer and more reliable remedy than the *subcutaneous division of the resisting muscles* near their pelvic origin.

“I have heard divergent and occasionally startling estimates of the operation which could not fail to astonish me, who have performed it so frequently without any unpleasant, and always with beneficial, effect to the patient, that I feel unable to substitute other

means without detriment to success. Aside from the immediate service of myotomy in arresting coxitis, it arrests at the same time the alteration and the loss in the growth of the extremity, and wipes out its mal-position.

“The principles laid down in the preceding remarks are equally applicable to the third stage of coxitis with this reservation, that if the disease has proceeded to ulceration of the ligamentum teres and caput femoris, I should, without hesitation, resort to exsection of *all morbid tissues*, decapitate the femur, curette the acetabulum and trim with scissors the fungoid wherever found, unite and drain the wound, and then place the patient in my wire breeches.

“I have as yet not specified the appliances of which I avail myself in the therapeutical management of coxitis. *Anything* answering the principle *best*, and which most *perfectly fixes* the joint, is available. It is for this reason that I never resort to extension or distraction, portable or otherwise. If anæsthesia and the powerful effort of a vigorous man do not effect a noticeable change in the contraction of a muscle, pulley and weight of four to ten pounds cannot do it either. Patients have come under my treatment who had borne twenty months extension under daily inspection of competent surgeons without making any beneficial impression upon the disease or its accessory deformity. And the assertion of parting the articular surfaces from one another is so direct a

contradiction of the physiology of the hip-joint as to deserve neither notice or following. Generally, I resort to plaster-of-Paris bandages, strengthened by strips of leather or veneering, and to Dr. Thomas' splint, which insures *perfect* fixation in the simplest, practical and cheapest manner.

“And yet I have not referred to the constitutional, especially the tubercular, origin of coxitis. No doubt such forms occur and are difficult to overcome. They reappear elsewhere if removed at one locality, and eventually terminate with the life of the unfortunate patient. Happily, their occurrence is but rare on this side of the Atlantic. Certainly not in the proportion of 100 tubercular joint affections to one of traumatic causation, as Prof. Koenig stated in his work on Surgery, and Prof. Fedor Krause affirms.

“Obviously, the bacillus tuberculosis is either an *avis rarus* in our midst, or exceedingly more docile and complaisant, promptly deserting its articular hunting grounds for parts unknown, and inaccessible if its sway is but disputed by a mechanical appliance.

“As a matter of course, a patient afflicted with coxitis ought to be surrounded by the best of hygiene and maintained by most generous diet.

“The tuberculin or Koch's lymph has not realized the enthusiastic expectations of Koch's disciples and seems to be more dangerous than the disease itself against which its virtues have been pitched.

“I for one, in the face of Virchow's late patho-

logical revelations, should feel disinclined to expose my patients to so precarious a venture."

D. DR. C. FAYETTE TAYLOR'S TREATMENT.

Dr. Charles Fayette Taylor, of New York City, considers that it is not enough to stretch the muscles; they must be stretched till they yield, and they must be kept stretched and relaxed until the disease in the joint subsides. It is only by so doing that the legitimate results of antagonizing the muscles can be claimed. He claims that the first important object is to seize the leg in such a manner as to exert against it an unyielding force, and not to interfere with the circulation or to injure the knee by unequal strain either above or below it.

Dr. Taylor directs that a strip of adhesive plaster long enough to reach from the waist to the foot and from three to five inches at the upper, and about one-third that width at the lower end be taken out and cut into five tails, as shown in Fig. 27.

A piece from four to six inches long is to be cut from the centre tail and tied to the lower end to straighten it. If the patient be strong, one or two more similar pieces are laid on the same place where the buckle is attached. Two similar straps are then to be prepared, one for the inside and one for the outside of the leg and laid against the lateral aspects of the leg; the ends with the buckles beginning about two inches above the internal and external malleoli, and the center tails reaching the entire length of the

leg and thigh to the perineum inside and the trochanter on the outside. The lower strips or tails are then to be wound spirally around the leg to the pelvis and afterwards the other two pair of tails which

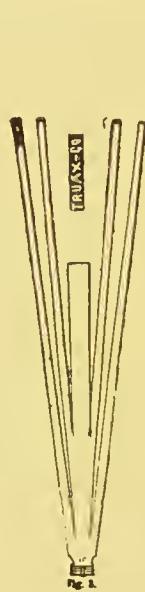


Fig. 27.

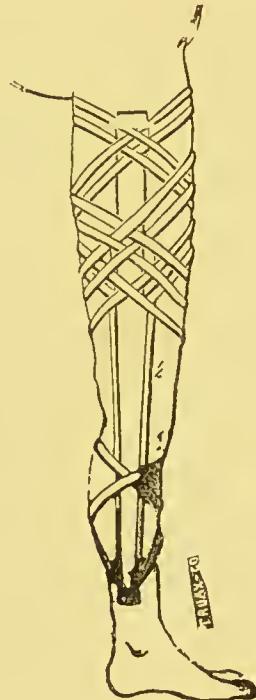


Fig. 28.

are cut down to just above the knee are also to be wound about the thigh in the same manner. When completed, he describes the thigh as involved in a network of strips of adhesive plaster which act equal-

ly and without pressure on the whole surface. The leg has about one-fourth of the attachment, and the thigh three-fourths, which is found to be the right proportion, he considers, to protect the knee from compression or strain.

A few turns of the roller bandage are then made around the ankle just under the lower end of the strips, which serves as a protection to the flesh under the buckles, and then it is to be continued over the straps on the whole leg, as shown in the other figures. Thus prepared, he considers the patient ready for the splint.

Dr. Taylor's splint consists of a hollow rod of steel (A) reaching from the ankle to the hip with the foot piece (C) working in the lower end and lengthened and shortened by the key (H) which works in a rack on the outside of the inside bar. The upper end is solid and very strong, and is used, except in special cases, fastened to the pelvic band (B) by a simple bolt at the end. When secured by a special attachment to the pelvic band a screw at (D) permits abduction to be made and the abductor muscles can then be directly antagonized. B is the pelvic band just mentioned, which is made of steel strong enough to support the patient's weight without yielding in the least, and is about two-thirds of the circumference of the pelvis measured over the trochanter major.

This terminates in a strap behind which fastens into a buckle in front. FF are perineal straps made

of rollers of flannel covered with kid or some non-irritating material, and terminating in pieces of webbing strong enough to hold in the buckles. These perineal straps he places near together in front (D) to



FIG. 29.



FIG. 30.

avoid lateral pressure on the tendons of the adductor muscles, which might be painful; but he places them far apart behind, passing under the ischii on either side to reach the pelvic band, as shown in Fig. 30.

E is a leather pad to steady and support the knee, and fastens at I to a movable cross piece. The foot-piece, the shaft (C) of which extends into the hollow bar (A), turns under the foot, and is covered by a piece of rubber pipe or leather tube drawn over to prevent jar in walking on the instrument. A leather strap passes under the foot through apertures at each end of the horizontal part of the foot-piece, turns up an end on each side of the ankle, and fastens

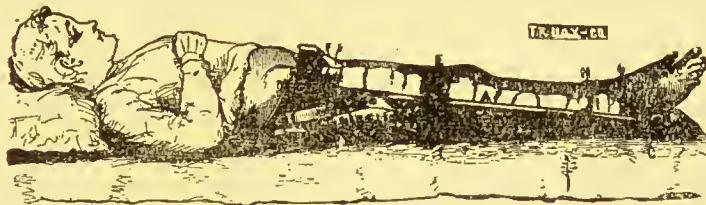


FIG. 31.

to the buckles on the ends of the adhesive straps at G. The strap (K) regulates the position of the pelvic band (B) to correspond to the inclination of the pelvis. He recommends that the instrument should always be applied with the patient lying on his back (Fig. 31); and great care ought to be taken that the pelvis is not inclined forward by contractions of the flexor muscles. If such should be the case, he directs that the leg should be elevated till the lumbar vertebrae come near the couch, then the instrument is to be applied as first described. The pelvic band (B) he considers ought not to embrace the pelvis tightly, but

there should be room enough for the leg to move freely in it, and the anterior superior spine of the ilium ought to be above the pelvic band, as shown in Fig. 31.

When all is adjusted, while the patient still lies on the back, the key (H) should be turned to the right and the instrument elongated, when the whole leg will be gently but strongly drawn outward, and the pelvis lifted up with a direct yet easy force from which he considers there is no escape.

In any variation of position or muscular action, he considers the direction and amount of force employed entirely under the surgeon's control, and the instrument should be so adjusted that there is a little space between the foot and the foot-piece, so that in standing or walking the weight does not rest on the leg, but the whole weight of the body should rest directly on the instrument, the patient sitting firmly upon the padded straps, which, passing under the ischii and perineum, are attached at the pelvic band in front and behind.

He recommends that the unaffected leg should have an inch or more added to its length by increasing the thickness of the sole of the shoe worn on the foot.

In case any great amount of deformity has resulted from the irritation of the disease, he recommends the use of the inclined plane (I) in Fig. 32.

By elongating the instrument, if there is the least

adduction, the perineal strap on the opposite side will first bring a force against the pelvis on that side with a leverage directly against the adductor muscles, which overcomes it and brings the leg toward the median line, when the strap next the diseased leg will become engaged; but in most cases of adduction, either the opposite perineal strap is made shorter, or the abduction screw (D) is used, and the attraction of the adductor muscles more fully overcome by forcing the leg outside the median line.

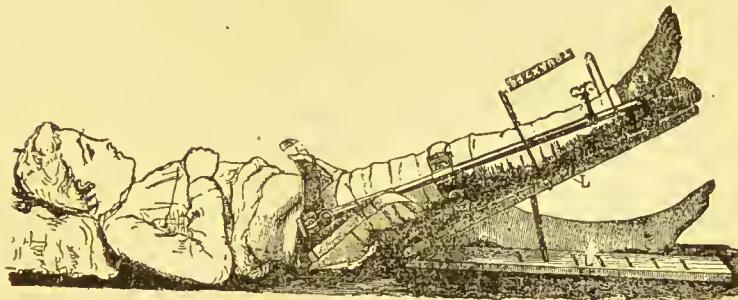


FIG. 32.

When this has been done, Dr. Taylor finds that on gradually letting down the inclined plane (I) there is no longer any flexion, and he considers that in a few hours in a position represented in Fig. 32, gradually changing, is sufficient generally to enable the patient to walk off in the usual manner. But in longer standing cases the muscles are very much more rigid, when it requires one or two weeks' management to reduce a severe deformity.

In the case of a man with long-standing and rigid muscular contraction with great tension and flexion at the hip-joint, he applies the instrument without the least attempt to strain the leg at the hip, and often it is adducted so far as to pass over the other leg, as shown in the engraving. (Fig. 33). In such a case,

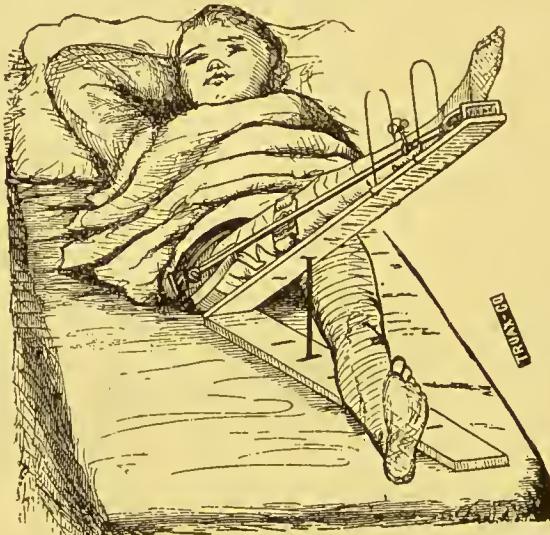


FIG. 33.

great care should be taken to prevent the pelvis from inclining forward, as the flexibility of the lumbar vertebræ will incline to do, if there is rigid contraction of the flexor muscles; but the inclined plane must be carried up in such a case, as he directs, till there is no strain on the flexor muscles, and the back lies close to the couch, as in Fig. 32.

Moderate extension he then directs to be made by lengthening the instrument in the ordinary way till the whole leg is well stretched, and by turning in the abduction screw (D) the whole power of the instrument is exerted on the adductor muscles. This screw (D) opens the hinge-joint attachment and forces the shaft of the instrument (A) and the opposite side of the pelvis farther apart, thus abducting the leg.

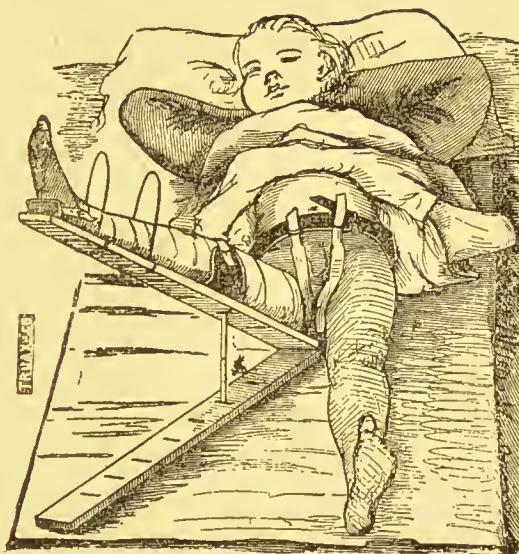


FIG. 34.

He directs that this process be carried on from day to day, not forcibly but only so fast as the muscles relax under the steady unyielding extending force exerted on them; and in most cases he considers one

week necessary to the accomplishment of this purpose; afterwards the inclined plane is lowered from day to day until, after ten or fourteen days from the beginning of the treatment, the leg comes down in

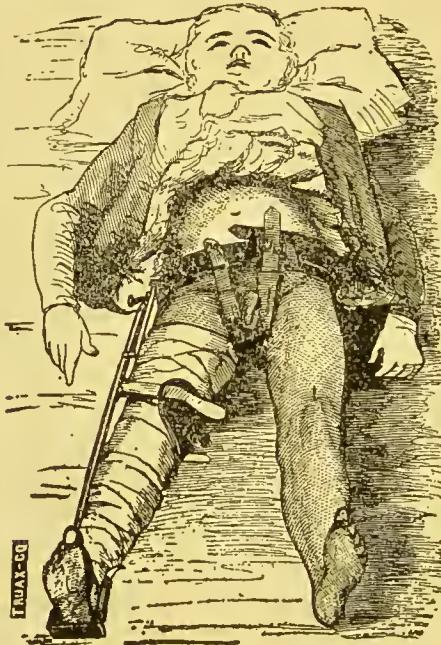


FIG. 35.

position and slight abduction incident to the early stage of the disease, and no further attention need be paid to the position of the leg. The traction necessary to be kept up for continuous relief to the joint will overcome abduction, and will also effectually prevent any recurrence of distortion.

If it is found after abducting the leg, and the patient has been for some days in the abducted position (represented in Fig. 34), that the leg does not readily come down (becomes less flexed) to an improved position, Dr. Taylor considers it due to the

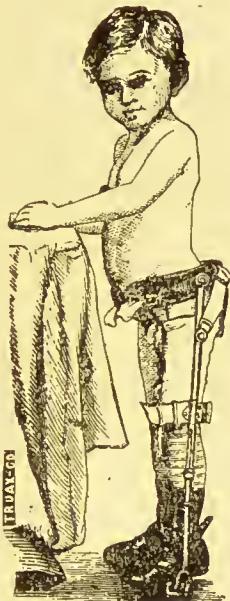


FIG. 36.

fact that the fascia which covers the thigh becomes shortened to correspond to the long-continued flexed position, and that there will be in such a case an elastic band continuous to the spine of the ilium, which he never hesitates to divide on the anterior and external aspects of the thigh; but division of the tendons of the adductor muscles he considers never necessary.

After all pain and sensitiveness in the joint have ceased, and when there is no longer a disposition of the muscles to take an abnormal contraction, and there is free motion in the joint, Dr. Taylor raises the

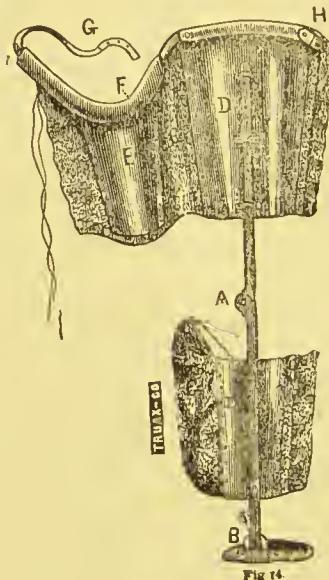


FIG. 37.

question whether the patient is safe. Is he then to be discharged as cured? And he answers: "No, not yet"; that there is a tendency to relapse, which must be provided against. And, for this purpose, he has contrived another instrument which is intended to sustain the weight of the body from resting upon the hip-joint without restricting in any manner the move-

ments of the limb in locomotion. It is constructed and used in the following manner:

A strong upright bar of steel is joined at (A) in such a manner that when vertical the rivet of the joint is behind the vertical line. He considers it evident that, with such a joint, the vertical weight would not only be sustained, but would also add firmness to the supporting bar. (DD) are steel plates about one-fourth the circumference of the leg, to which are attached the broad bands of leather which lace around the leg and thigh. The lower steel plate is riveted to the upright, but the upper one is fastened by three keepers, which enable it to be raised or lowered in adapting the instrument to the length of the leg. (B) is a foot-piece intended to rest under the foot inside the shoe. The broad band of leather (C) is cut down at the top where there is a firm pad (F) terminating in the strap (G), which, when the instrument is applied, fastens in the buckle (H). The leather (C) has a thin metal plate (E) riveted to it, to give it more firmness. The instrument is adjusted at such a length that the heel does not reach to the foot-piece (B), but there is a little space beneath the foot, so that the padded strap (G F) passing under the ischium and resting close against the perineum is arranged in such a manner as to sustain the entire weight of the body while the patient is standing or walking; but care should be used in applying the instrument that it is not laced too close, Dr. Taylor in-

sisting that the leg ought to move freely in it, so that the whole weight will rest on the padded portion at (F) and not on the leg and joint. The foot is to be



FIG. 38.

dressed in the ordinary manner; space between the bottom of the foot and the foot-piece being too small to interfere with applying the shoe as usual and the shoe itself is sufficient to keep the instrument in place; but a small piece of adhesive plaster properly applied to the leg and the lower end fastened to the buckle

near the bottom is generally preferred for sustaining the instrument.

He draws attention to the fact that, by the peculiar construction of the joint at (A), the leg when lifted bends freely at the hip, knee and ankle, but when straight, as in standing, the joint is forced backward and the instrument becomes firm and unyielding, and neither pressure nor concussion can be sustained by the hip joint.

With regard to exercise, neither close confinement nor perfect freedom should be allowed, but he insists upon a conservative middle course, care being always taken to protect the patient from bodily fatigue as well as the joint from injury.

E. PROF. LEWIS A. SAYRE'S TREATMENT.

Dr. Sayre's (of New York) first splint for the mechanical treatment of this joint, consisted of a narrow steel apparatus extending from just above the crest of the ilium to within two or three inches of the external malleolus, and was divided into two parts at the knee, so that one ran into or by the side of the other and was capable of being extended at will by a ratchet and cog-wheel near the knee, elongation being produced by a key.

The upper portion of the instrument was corrugated to increase its strength, and in a groove at its upper extremity was a ball-and-socket joint, to which was attached a pulley or wheel for the counter-extending catgut cord to apply through it. This catgut

was attached at either end of the perineal band or counter-extending belt, which was made of thick

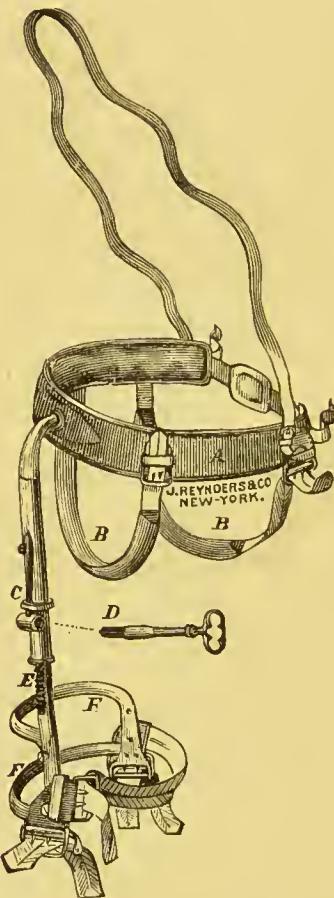


FIG. 39.—Sayre's Short Hip-Splint.

India-rubber tubing, and being firmly secured at either end, made an elastic and comfortable air-

cushion for the perineum. At the lower end of the instrument was a small roller extending nearly its entire width and just above a buckle for the purpose of securing the firm webbing or strap, which passed over the roller at the lower end and was sewed fast to the strong adhesive plaster, for the purpose of making the extension.

Since that time he claims to have improved his splint in many respects, and the instrument now most commonly employed by him is a short thigh splint, seen in Fig. 39, consisting of a pelvic band passing partly around the body under the crest of the ilium, well padded on its inner surface, to which usually two perineal straps are fastened. Its outer surface holds a ball-and-socket joint, from which runs a steel rod or bar joint from the outer side of the thigh to within about two inches of the lower end of the femur.

This outer bar is divided into two sections, one running within the other and controlled by a ratchet and key. At the lower extremity of the outer bar is a projecting branch to be applied to the inner surface of the thigh, to receive the attachments of the plaster, hereafter to be described.

Both of the lower extremities terminate in a cylindrical roller over which pass the tabs of the plasters attached to the two buckles placed at the lower ends of the instrument.

He recommends when the short splint is used the employment of some means for making an ex-

tension during the night and also at other times when it is expedient for the patient to lie in bed. This is best effected, he thinks, by means of a weight and pulley. (See page 22.)

To apply this short hip-splint, he recommends preparation of the limb in the following manner:

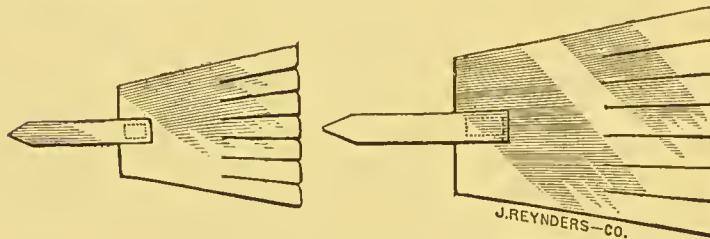


FIG 40.

First cut two triangular or fan-shaped pieces of adhesive plaster, the broad extremities of which should be wide enough to cover about half of the surface of the upper part of the thigh. These are to be slit into strips an inch or more in width and should be of sufficient length to reach from the knee to the groin. To the narrow end of these fan-shaped pieces should be sewed a piece of stout tape or webbing, non-elastic, three or four inches in length, and as wide as the cylinder at the lower extremity of the instrument.

Now place the instrument upon the thigh, with its jaws about three inches above the condyles, and with the thumb and finger grasp the limb at the point upon either side where the instrument comes in con-

tact with it, these two points indicating exactly where the tab ends of the fan-shaped pieces of adhesive plaster are to be applied.

Now, having placed the tab extremities over these bands, secure them in position with a roller bandage, first making a few extra turns near the tabs, and then carry the bandage snugly and smoothly over the plaster upon the thigh until the perineum is reached, when the strips of plaster which are now floating loose are to be reversed as the bandage goes around the thigh, continuing the bandage at the perineum until the line of the strips of plaster is reversed, and then the bandage is to be carried down the thigh.

The thigh is now ready for the splint, and after the shaft has been shortened as much as can be, place the splint in position with the pelvic cross-bar at the upper end just under the crest of the ilium. Now fasten the lower extremity of the splint first, and this is done by passing the tab around the little cylinders in the joint upon either side, buckling them as high as possible, and then buckling the strap that passes behind the thigh.

Next he directs to buckle the perineal bands, drawing them snugly, but not too tightly, and taking the precaution to have the smooth side next the skin. He also recommends placing a piece of old linen in the groin under the bands to protect the parts from pressure, and also to absorb the moisture commonly

present in this region, as the neglect of these little precautions often gives the patient and surgeon a great deal of annoyance.

The instrument now being in position, the nice adjustment which is to regulate the amount of exten-

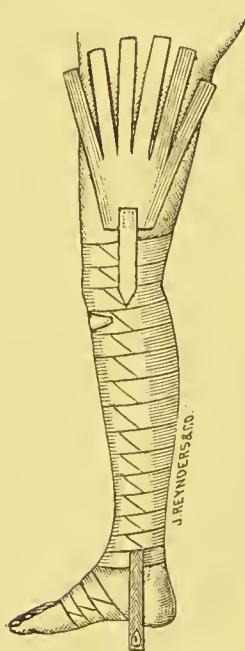


FIG. 41.

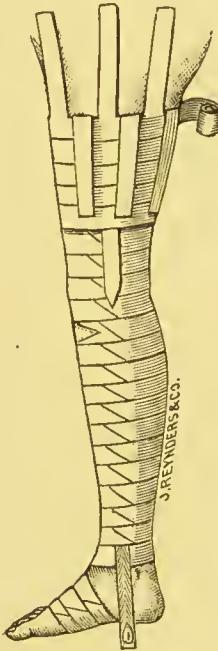


FIG. 42.

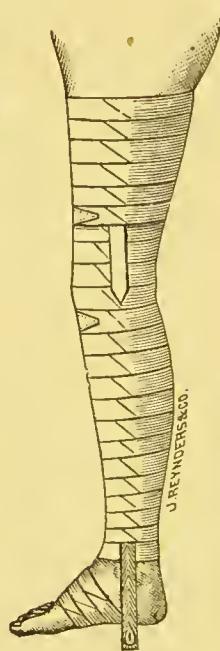


FIG. 43.

sion is made by means of the key, and in this way he claims the exact amount of extension necessary can be applied, and it is to be regulated by the following rule:

Sufficient extension is to be exerted, so that when

a sharp, sudden concussion is made from the knee or heel, when the limb is straight, no pain whatever will be caused, the patient's face being the guide in deciding when a sufficient amount has been obtained. More extension than this may give rise to an obstruction of the circulation and do an infinite amount of harm.

If the patient is a small child, the splint may be used without crutches, but if of sufficient size, crutches will be necessary, for the plaster, he claims, is only intended to retain the instrument in position, and maintain sufficient extension to relieve the joint from all pressure, but not to support the weight of the body if the child is heavy.

If, after the application of the splint, the patient suffers pain, it is evidence that the splint has not been properly adjusted, and it should be carefully examined, for it may be that the plasters have yielded sufficiently to permit pressure upon the joint, which can be easily remedied by giving a little traction with the key.

He emphasizes the following rules as being important, and claims that neglect to observe them has many times brought the instrument into disrepute:

1. Always shorten the shaft before applying or removing the instrument.
2. See that the jaws are tightly buckled, so that they will not be crowded down and press on the condyles.
3. Do not take the tape between the roller and the bone.

4. Do not buckle the perineal band too tightly, for in that manner the femoral vessels may be obstructed, but rather make extension with the key, which tightens the band by crowding it upward rather than by girdling the limb.

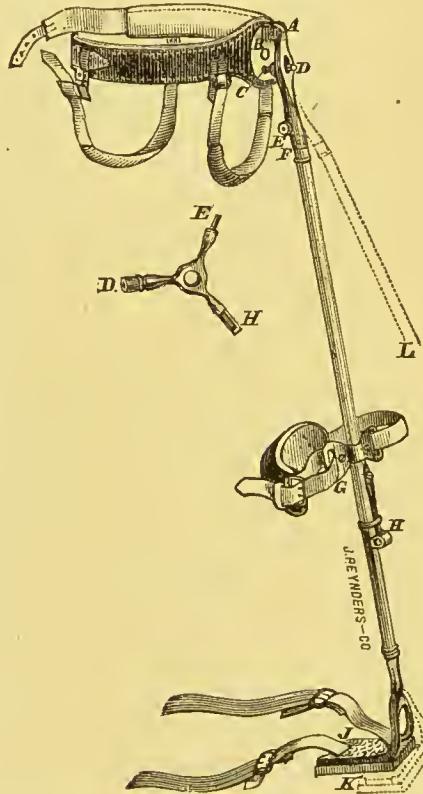


FIG. 44.—Sayre's Long Hip-Splint.

He also emphasizes having the sole of the boot or shoe worn upon the sound limb made extra thick.

He also uses a long splint which he describes as a modification of that devised by Dr. C. F. Taylor, this differing from the short one in the following particulars:

1. It extends the entire length of the limb, receiving the weight of the body at a cross bar under the feet, and has two perineal straps with an iron girdle nearly encircling the pelvis.
2. The long bar reaching from the pelvis to the bottom of the foot is hollow and has another running inside of it, furnished with a ratchet and key, as in a short splint.
3. The cross bar at the bottom of the instrument is covered with leather and a strong leather strap passes beneath two iron rods just above the cross bar, to which are attached the tabs from the adhesive plaster on the leg.

There is also a knee-pad, which is attached to the bar running along the outer side of the limb in such a manner that it can be moved up and down to any joint desired.

He also describes an additional means for applying elastic force. This is attached to the posterior part of the instrument in cases when the thigh is strongly flexed. It consists of an elastic band attached above the knee running along the back of the thigh and secured to the posterior portion of the pelvic belt. This band can be made tighter as occasion may require for the purpose of extending the limb,

and should be elastic for the purpose of keeping up constant tractile force and at the same time allowing conflexion when the patient wishes to sit down.

This instrument, Dr. Sayre states, has been improved by Mr. Reynders by the following additions:

The improved parts are where the long rod is attached to the pelvic band. The long rod is attached at (a) to a round revolving plate (b) which is fastened to the pelvic band. When the plate (b) is revolved partly, the long rod moves forward and backward from the point (a). The long rod moves from and toward the other leg as shown by the dotted lines towards (l). (c) Is a screw terminating at (d) in a strong square stem of steel fitting to a key. This screw turns in and out of the revolving plate (b) and has at the end of the thread a little knob, which is somewhat larger than the perforation at the upper end of the long rod, so that when the key is applied at (d) and turned, the screw (c) will force the long rod in the direction toward (l). In this manner, abduction is made at (f), the long rod is divided into two parts, the lower part holds the endless screw transversly, which is moved by (d), and rotation thus produced.

Prof. Sayre prepares the limb for the long splint in the following manner: He advises that two strips of strong moleskin adhesive plaster should be cut from two to four inches wide, according to the size of the limb and long enough to reach its entire length,

then divide the upper extremity of the plaster into narrower strips for a distance of two or three inches. Pieces of strong webbing one or two inches in length with buckles attached are sewed to the lower extremities of the plasters; these plasters are then to be placed on either side of the leg in such a manner as to leave the buckles a little above the joint, and then so secured by a snugly adjusted roller as to leave the tabs with the buckles attached hanging loose. The roller is then carried up over and as far up the thigh as can be done with convenience, when the upper split ends of the plaster are reversed and braided in with the roller as it returns down the thigh, securing it smoothly. The stocking is then pulled on with holes on either side for the buckles to pass through, and the shoe applied with holes cut through it in the same way.

The limb now being prepared, the instrument is placed on its outer side and the cross bar at the bottom brought in front of the heel of the shoe and secured and buckled to the tabs above described. The pelvis belt is next brought around the hips and secured by the buckle upon the opposite side and the perineal bands are now attached as strongly as may be. The pad band is then to be slipped up or down until it is made to rest at the knee when it is passed around the leg and buckled. Examination is now made with the key upon the ratchet until frequent pressure is borne without pain and the patient can

walk without cane or crutch. If the limb is adducted, the adducting screw can be used daily, increasing the tension for the purpose of abducting the limb. If the limb be strongly inverted, he advises the use of the eversion screw, the force being gradually applied for the purpose of rotating the foot outward; and if the thigh is strongly flexed, the force exerted by the elastic band upon the posterior part of the splint can be applied for the purpose of producing extension.

If the patient be uneasy, restless, irritable, and does not bear the extension apparatus well, Sayre recommends the use of the wire cuirass, or other fixed apparatus, but he emphasizes the danger of permitting the patient to wear such fixed dressings too long, advising their frequent removal and the employment of passive motion.

Again, as the deformity is sometimes so great as not to permit the immediate application of the splint, he recommends in such cases placing the patient in bed and applying extension in the line of deformity, and then gradually, day by day, bringing the limb nearer the normal position; and when this has been nearly or quite reached, the adjustment of the splint is made, and the patient can be permitted to leave the couch. Sometimes it happens that the muscles have become so firmly contracted that they will require subcutaneous section before the limb can be brought into its proper position, and in such a case he recommends that procedure.

He recommends very strongly to bring the limb as soon as possible into a proper position, so that the splint can be used and the patient permitted to obtain the benefits of sunlight and fresh air, even if the splint cannot be worn more than a few hours each day. The change of position, the moderate exercise, the sunlight and fresh air which the patient is able to obtain without endangering the diseased joint, he claims will be of great benefit to him, and the use of the bed extension with the splint — the one at night in stormy days, and the other when the weather is pleasant — he considers to be the proper application of the principles involved in the treatment of the joint in its first stage. But, in the second stage, he claims the treatment differs according to the condition of the joint and the character and quantity of its contents. If the disease is simply subacute in character, the joint not disintegrated, the effusion small in quantity, slight but permanent extension comes first, and this can be accomplished by the extension apparatus already described.

In this state, continuous extension in bed, preparatory to the application of the splint, will, he thinks, be more frequently required than in the first stage. If the inflammatory action is somewhat active, repeated moderate depletion by means of leeches or cups, pressure by means of adhesive straps and mild mercurial treatment, both internally and externally, he recommends to assist in subduing it and permit the absorption of the fluid. If the inflammation is espe-

cially violent and the pain upon slight motion intense, then absolute rest is requisite, and for such cases he recommends the wire cuirass, especially in small children. If the inflammation is very acute, indicated by local pain, heat, and general constitutional disturbance, and the patient has a vigorous constitution, and suppuration has not yet begun, the cause being clearly trochlear, he deems an energetic antiphlogistic treatment to be the safest method of subduing the inflammation. If the joint becomes distended, causing great local trouble and reflecting detriment upon the general system, he recommends the prompt removal of the fluid by means of the aspirator or small trocar with a canula attached to an air-tight syringe.

After the removal of the accumulation, the patient should be secured in some apparatus—the wire cuirass he considers the most convenient—in order to prevent the possibility of motion, and a low diet and a moderate antiphlogistic treatment followed for a few days.

If re-accumulation of the fluid takes place, the operation is to be repeated. If the articular surfaces have become ulcerated, the cartilage disintegrated and the bones eroded, Dr. Sayre considers the exsection of the joint not only justifiable, but in most cases absolutely essential.

For the third stage of the disease, he suggests that nature should be assisted by mechanical appliances in her efforts to bring about a spontaneous cure.

If ulceration of the cartilages and bones is pres-

ent and accompanied by a purulent effusion, he considers the question of exsection as being of prime importance; and he states that, if the discharge is found to be diminishing, the general health of the patient improving, and the limb can be brought into a position in which it rests easily, it is better to permit the case to go on and allow the cure to be completed by the gradual exfoliation and discharge of dead bone, according to nature's method, than the result of the operation. But if symptoms of progressive caries are developed in the part, if the disease, instead of improving, progresses in spite of all efforts to subdue it, the general health of the patient daily becoming undermined, and there are no symptoms indicating repair, he considers the only justifiable treatment left for the surgeon is exsection of the joint, as in all such cases the disease would otherwise probably proceed to a fatal termination.

(f) DR. SHAFFER'S TREATMENT.

Dr. Newton M. Shaffer, of New York City, has introduced a modification of the Taylor hip splint, which possesses practical value. He states that Dr. J. C. Hutchinson, of Brooklyn, first publicly called attention to the fact that as soon as the weight of the body is thrown upon the perineal pads, extension as such ceases in the long splint, and they become in reality nothing but perineal supports. That this is so he considers is demonstrated by the bagging of the leather straps which pass in the foot-piece of the in-

strument to the adhesive plaster buckles at the ankle whenever in walking the weight of the body overcomes the traction force.

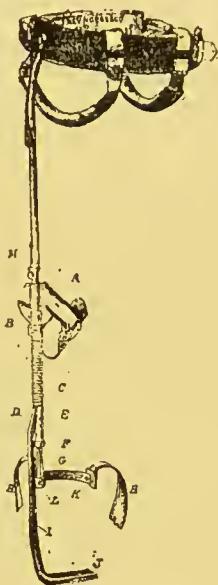


FIG. 45.—Shaffer's Long Hip Splint.

In commenting upon this feature of the Taylor-Sayre long splint he notices first that a cylinder is attached to a pelvic band and by means of perineal pads attached to the pelvic band, a means of counter-extension is provided; and also, that an extension rod slides back and forth in the cylinder by means of a ratchet and key movement. This extension rod terminating in the foot-piece above alluded to, the foot-piece forms the band of attachment for the straps

which pass through the adhesive plaster. He then draws attention to the fact that when the extension rod is pushed out by the ratchet and key movement, direct extension of the limb occurs; but when in walking the foot-piece presents to the ground, the instrument being practically one continuous steel rod, it cannot shorten. Thus the entire weight of the body bearing downward upon the perineal pads overcomes any extension force which does not exceed in pounds the weight of the patient. He says that with the Taylor-Sayre splint, it is easy to produce and maintain extension when the patient sits or lies down, but the moment he commences to walk, the foot approximates the foot-piece, the lower extension straps become loose and the patient is able to swing the limb backward and forward to a very considerable extent; but when it is altogether thrown upon the sound limb, extension again occurs. To obviate this, he advocates an instrument founded upon the same general principles, but with the following modification:

Instead of continuing the extension rod to and below the foot, it is made to terminate at a point about one and one-half inches above the malleoli (*g*) and a band is attached which passes half way around the limb posteriorly (*k*); to this band he rivets two straps (*hh*) which are attached to the adhesive plaster buckles. The foot-piece (*j*) has an independent rod (*i*) which passes upward to the piston arrange-

ment at (*d*) and above the point of exit of the extension rod.

When this instrument is applied and the weight of the body is thrown upon the perineal pads, he claims that the instrument shortens by a compression of the spiral spring at (*c*); in other words, that the entire part (*d*), (*i*), (*j*) moves upward, or the weight of the body is expended in shortening the spring, the straps at (*hh*) remaining taut all the while. The same degree of extension is exerted upon the diseased hip joint, he claims, whether the patient lies down or walks; and he considers that traction is thereby constantly maintained and the joint surfaces not alternately protected and then exposed at every step as in the Taylor-Sayre instruments.

He claims that the spring acts automatically, and as soon as the foot-piece is removed from the ground, the instrument lengthens and is again ready to receive the weight of the patient.

The limb is now ready for the application of the instrument, which is to be placed on the limb in such a manner as to bring the side-bars upon the same plane with the condyles of the femur, the hands of an assistant to hold it steadily in that position. The collar embracing the leg should be closed so as to closely engage it but not sufficiently tight to interfere with a free return circulation.

He next directs to reverse the loose extremities of the pieces of adhesive plaster, then to bring them

snugly over the collar and upon the leg, where they are to be secured by a few turns of the roller bandage, which is just to cover the foot and secure the upper portion of the plaster. He then presses the lower collar down into the plasters which now engage it, and then secures the upper band about the thigh.

As a precaution, to prevent the band tilting sufficiently to come in contact with the thigh and produce serious results by pressure, he recommends taking one piece of plaster behind and another in front at points exactly opposite, upon the circumference of the limb, and reversing them in such a manner as to bring equal traction upon the collar posteriorly and anteriorly, thus balancing it so that its edges will not come in contact with the thigh at any point, the band around the thigh being first closed only sufficiently to be comfortable. When this is done, the remaining strips of plaster can be reversed without causing the edges of the collar to make pressure at any point, and all are then secured with the roller bandage.

Traction may now be produced by means of the key and ratchet on the bars of the instrument to a sufficient degree to produce perfect relief from pain. If too great tension is applied, the patient will complain of a sense of discomfort; and he recommends the countenance and feelings of the patient as a guide with regard to the amount of extension to be applied.

The patient, if an adult, may probably require the aid of crutches in walking, but, if a child, may go about without assistance.

(g) DR. ROBERTS' TREATMENT.

Dr. M. Josiah Roberts has utilized the principle of elastic traction very extensively in the splints which

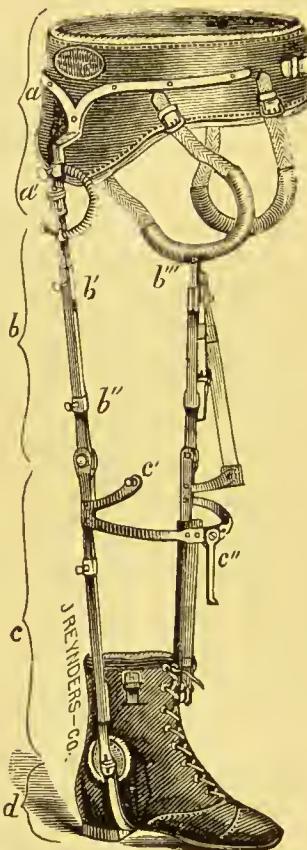


FIG. 46.—M. J. Robert's Long Hip-Brace.

bear his name. Perhaps the most useful of these is shown in Fig. 46, and of this he says: "In the light

of my present experience I should advise the short splint only in those cases where convalescence is in progress; the patient having a long thigh to which the instrument can readily be attached. The same principles of treatment can be enforced and greater supporting power afforded by the long splint, shown in Fig. 46. It consists of four segments which respectively correspond to the pelvis, a; thigh, b; leg, c; and foot, d. The pelvic and femoral segments are identical in construction with the corresponding parts in the short splint, *vide* figure, excepting at a, where a ratchet clamp joint, as introduced by Dr. Stillman, permits of rotation." "Like the short splint, this instrument is constructed to exert *elastic linear traction*. The mechanism for the accomplishment of this is the same as that in the short splint. In the long splint, however, the segments corresponding to the thigh and leg are both provided with compound or sliding side bars. At (bb") are shown the pins secured to the free ends of the sliding bars to which is attached an elastic side strap. The four side bars comprising the thigh and leg portions of the instrument are similarly provided with pins and elastic straps. At (b'') is a universal joint connecting the inner lateral shaft with the upholstered perineal stirrup. From the lateral bars of the splint just below the knee, there projects anteriorly a semi-circular piece. Attached to the middle of this is an adjustable metallic arm projecting downward in a line with the spine of the tibia.

From this arm, as a fixed point, there extends a broad elastic band around the leg behind the head of the tibia, which serves to keep the instrument constantly in the same relative position to the limb. From the semi-circular piece on either side at the points of its attachment to the lateral shaft of the splint, there projects directly forward a metallic arm (c), curved upward. To the end of this lever is attached a strong strip of elastic webbing, which passes up through a buckle attached to a pin (b). These elastic straps, one on either side, are designed to supplement the function of the quadriceps extensor muscle. At the junction of the leg with the foot segment, a French joint permits of their easy disarticulation, a matter of great convenience in the application of the splint. In the application of the instrument, long and broad strips of adhesive plaster are used in precisely the same manner as in the application of a Sayre splint, the lower ends tipped with non-elastic webbing passing through buckles attached to the shoe on either side.

(2) *Extension Apparatus without Spinal Support or Facilities for Motion at the Hip.*

A. DR. ROBERT W. LOVETT'S TREATMENT.

Dr. Lovett, of Boston, in a recent paper,* states that the splint shown in Fig. 47 is not presented by

* Transactions of the American Orthopædic Association, 1889, p. 197.

him as a splint for the routine treatment of hip disease, but as a means of furnishing fixation and traction in bad cases while the patient goes about on crutches. He claims that it necessitates the use of crutches; makes it impossible for the patient to climb fences, and knock about in the way that so many children do with such disastrous results; and makes it possible for a child to go comfortably about even with a joint exquisitely sensitive to every jar. He states that it is clumsy, and for a while patients are much bothered about sitting down; but they learn to sit sidewise, and cease to mind the splint.

He claims that it possesses one further advantage in the treatment of deformity—it can be bent to fit a limb, however much it is flexed, and can be gradually straightened as the muscular spasm relaxes without necessitating confinement to bed; and in a similar way adduction and abduction can be corrected by bending the splint laterally to fit the limb in its mal-position, and gradually bringing it back to a straight line as the spasm relaxes under the influence of traction exerted in the line of the deformity.

The splint shown in the diagram is for the right leg. The chest-piece, A B, is made to open by a hinge at the back, and when closed in place, is buckled across the chest. C is an arm for the perineal band, running in the same place as the perineal arm of the Taylor splint. D and E are the regulation thigh and calf pieces of the original Thomas splint.

From the outer end of E the foot-piece runs down below the foot, and ends in the ratchet and key arrangement for producing extension in use in the

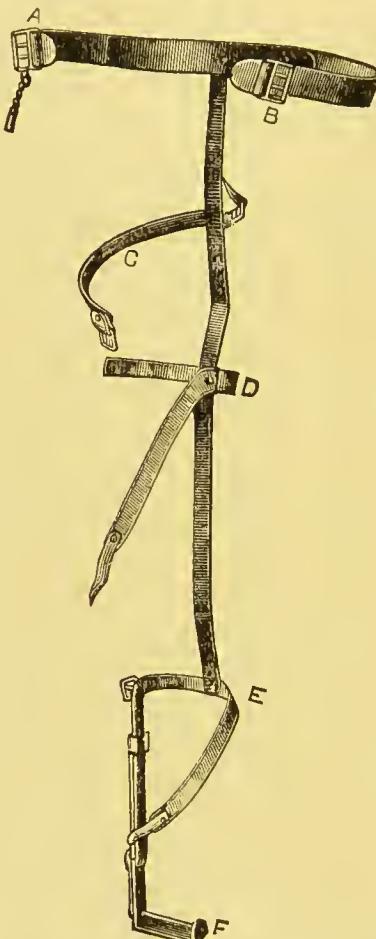


FIG. 47.—Lovett's Hip Splint, combining fixation and traction.

Taylor splints. The splint is applied, the perineal band adjusted, and the traction bar tightened last of all.

(b) DR. A. B. JUDSON'S (OF NEW YORK) TREATMENT.

In his opinion,* the chief defect in the long hip splint is this, that the straps which are fastened to the adhesive plasters at the lower part of the apparatus, for the purpose of extension, become relaxed whenever the patient assumes the erect posture and throws his weight upon the limb. The cause of this is due to an upright that is too frail, a pelvic band on too high a plane, and perineal straps too flexible. The apparatus employed by him is provided with a stronger upright and perineal band, and also a bolt and nut uniting the two parts, by which they can be secured at any angle. The splint has suspension straps, buckled to the pelvic band in front and behind, and passing over the shoulders, by which the plasters and diseased limb are relieved of the weight of the splint in walking. A U-shaped attachment is also provided, made of steel, placed at the level of the lower end of the thigh, by serviceable position.

FIG. 48.—A. B. Judson's Hip Splint (after Bradford and Lovett).



* Medical Gazette, New York, December 10th, 1881.

which motion is more effectually prevented than by a flexible knee-pad, by keeping the limb in a line parallel with the upright. Traction is used to fix the joint, rather than to oppose muscular contraction, which may be secured by means of two vertical strips of adhesive plaster upon the leg and thigh. He observes that the deformity incident to the acute stages of the disease is reduced unconsciously by the efforts of the patient while walking.

The fixation allays inflammation, promotes repair, relieves pain, and reduces deformity by means of the perineal straps used as an ischiatic crutch in locomotion. A high shoe is worn on the sound foot, and crutches are often used.

Dr. John A. Wyeth gave to this plan of treatment the name of the combination method. He combined the extension splint with the physiological method, and claimed for the treatment superior advantages. Dr. Judson concludes his contribution upon this subject as follows:

“ The deportment of the limb under this treatment is observed to advantage in a case that has progressed so far that the patient is confined to his bed while the thigh is in excessive flexion and adduction, and yet not so far that the structurally shortened muscles are an impediment to the reduction of deformity. Almost immediately the adduction is visibly lessened, and is succeeded in a few days by abduction, which in its turn becomes excessive, because the di-

rection of the traction is abductive or away from the median line. But when the patient has gathered strength from the relief of pain and the ability to sleep, which are assured by fixation, and begins to walk with the assistance of the ischiatic crutch furnished by the perineal straps, and with the aid of a high sole on the shoe of the unaffected side, it is seen that the abduction is, in its turn, gradually diminishing; and as the patient resumes active locomotion, still wearing the splint, the limb assumes a position neither adducted or abducted, in which it is most favorably situated for walking. And while the limb has been making these changes laterally, it will at the same time be reduced from a position of extreme to one of moderate flexion, in which it is most favorably situated for both walking and sitting. The favorable position thus acquired is retained without difficulty until recovery is assured."

Extension Apparatus Provided with Spinal Support.

A. DR. A. M. PHELPS' TREATMENT.

Dr. A. M. Phelps, of New York, has originated splints designed, so far as possible, to *absolutely immobilize the joint*; secondly, to *relieve intra-articular pressure*.

He maintains that to apply extension to a hip-joint, we should not only make traction in the line of deformity, but also in a line at right angles to that deformity. To relieve perfectly intra-articular pres-

sure, he claims that extension must be made in a line corresponding to the axis of the neck, and not with the axis of the shaft, for the following reasons: The adductors and abductors pass diagonally across the body from the pelvis to the femur. These, with other muscles, are the ones affected by spasm. *When they contract, the head of the bone is firmly drawn into the acetabulum, the force operating on a line corresponding to the axis of the neck. The flexors act on a line corresponding to the axis of the shaft of the bone.*

Busch, he believes, was first to call the attention of the profession to this fact. In 1873, Albert, of Vienna, again emphasized it, and quoted from an article published years before by Busch. He says, quoting from Busch, "that this is a second clear indication that distraction has a beneficial effect. But this purpose has not been reached by the usual method of traction. Busch has demonstrated, in a manner apparent to everybody, that traction ought to be made in the axis of the trochanter" (or neck). He further adds that Dumreicher says that "if you want to control the pressure, it is necessary to make traction in two lines; the muscles which pass from the pelvis to the femur act in two directions. The one draws the femur toward the median line (adductors and abductors), and the other flexes it."

When Dr. Phelps published his article setting forth these principles, he was not aware of the fact that these distinguished gentlemen had already ar-

rived at and had published the same conclusions. For years he had applied the principle of double extension; and that the principle is correct he has no doubt, provided it is admitted that traction is necessary in the treatment of hip-joint inflammation, and he is as firmly convinced of the necessity of traction when muscular spasm and contraction exist as he is of the only scientific method of applying it, viz., in a line parallel to the axis of the neck of the femur.

Then, believing that immobilization and extension in proper lines are the law, he has constructed the following splints:

To fix the hip joint, a splint must extend from the foot to the axilla. (See Figs. 49 and 50.)

Fig. 50 represents the perineal crutch, with the abduction bar, adjustable by means of the key, for the purpose of making lateral extension. The steel bar is adjusted to the steel ring, which makes a firm crutch, the pressure coming on the tuberosity of the ischium. Adhesive straps, extending to near the body from the ankle, furnish means of extension by tightly buckling them to the straps, the ring furnishing counter-extension. The rod, ending in the upper ring, prevents flexion and extension of the legs. The splint is intended to prevent every motion at the hip-joint, and at the same time apply extension in a line with the neck of the femur. Fig. 50 shows the crutch and splint adjusted, the patient using crutches, and standing upon a high shoe upon the well leg.

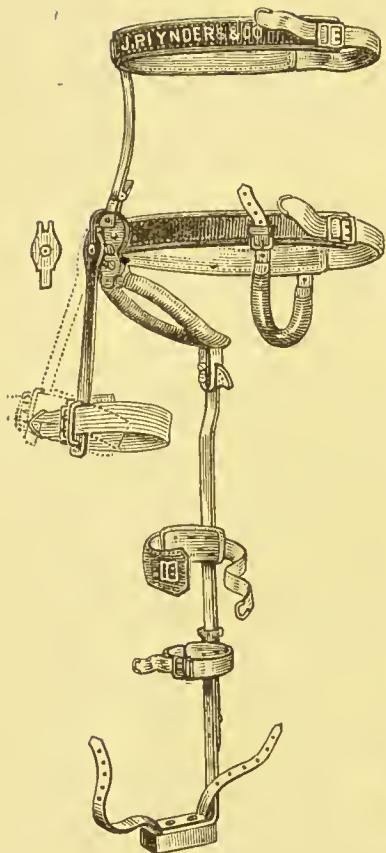


FIG. 49. The Phelps Splint.

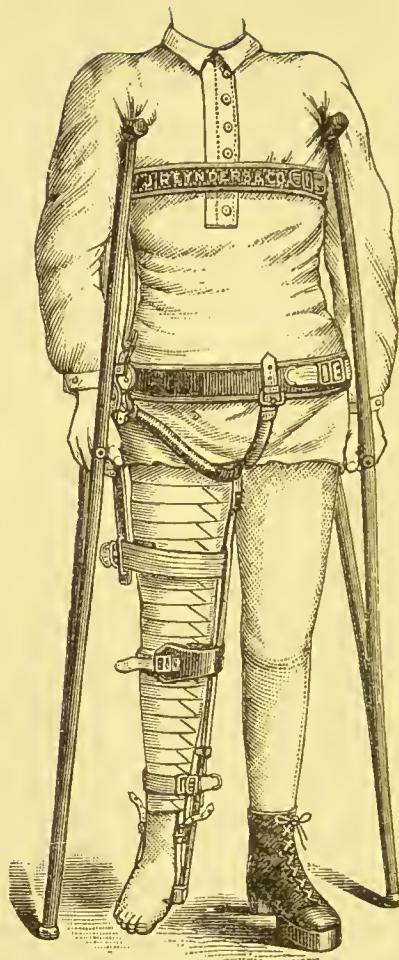


FIG. 50. The Phelps Splint Applied.

This splint he found a little too expensive for dispensary work. He then constructed the splint (Fig. 51), which simply does away with the extension joint and key. This was also too expensive for hospital work, but both splints did the work perfectly.

After a time, for his poor patients, in the hos-

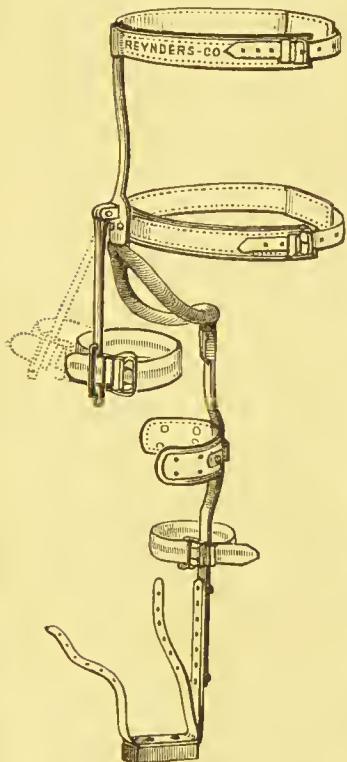


FIG. 51.

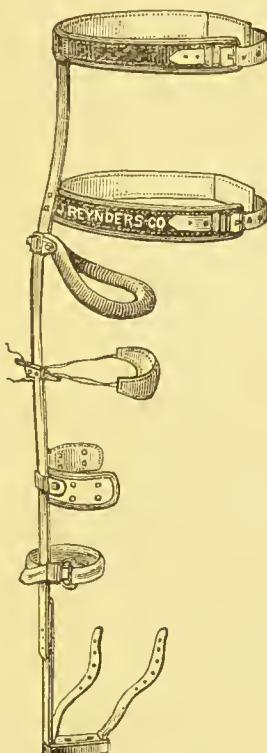


FIG. 52.

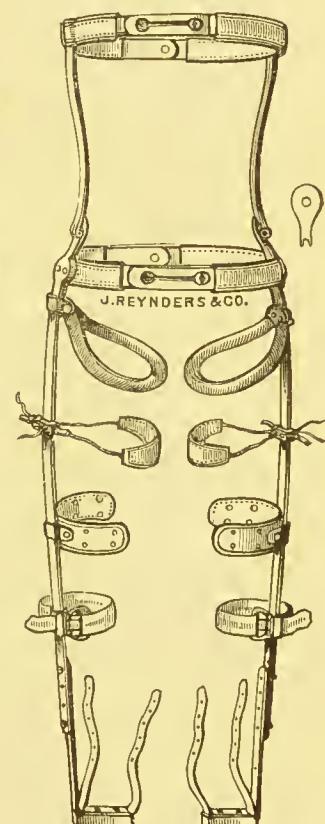


FIG. 53.

pitals and dispensaries, he succeeded in perfecting a cheap splint, which applies the principle of fixation and traction in the line of the neck.

A glance at the cut will convey the idea. Fig. 52 is the single and Fig. 53 the double splint for double hip disease. The splint is a bar of steel, extending from the foot to the axilla, accurately bent to fit the body. A tracing made on paper by laying the child upon it will assist in shaping the bar. A pelvic belt, a thoracic belt, and a steel perineal ring complete the fixation part of the splint. The straps in the foot-piece buckle to adhesive straps attached to the leg, which make longitudinal traction. The strap lashes the leg to the splint, making lateral traction precisely as the abduction bar acts in Figs. 49 and 50.

An ordinary blacksmith can construct this splint. Before either these or any other splint is adjusted, however, the patient should be treated in bed until deformity is overcome and the active stage of the disease somewhat modified.

Properly extend and immobilize the joint; that the intra-articular pressure results in the destruction of the joint or ankylosis in a large percentage of cases is proved by statistics; that the results in hip-joint disease should be as good as those of knee-joint disease, and will be, provided perfect immobilization can be carried out; that patients should never be allowed to step upon any portative apparatus; that a high shoe on the well leg and crutches should be insisted

upon until the patient is cured; finally, that the angular deformity seen in cured cases should not occur, and such cases are a standing rebuke to the splint and methods employed. In other words no patient with hip-joint disease need ever recover with angular deformity. In exceptional neglected cases of dislocation a slight amount of deformity had better be left than resort to osteotomy.

(B) DR. BLANCHARD'S TREATMENT.

Dr. Wallace Blanchard, of Chicago, claims priority over Thomas of Liverpool in this method of treatment.

Blanchard describes his apparatus as follows: "It is made mainly of strip iron known as 'binding,' and is bent to the form of the body by means of an ordinary monkey-wrench. The main strip should extend from the lower angle of the scapula down over the back, thigh and leg on the affected side to within two inches of the heel. To this are riveted three bands, one to fit loosely around the body just below the armpits, a second at the knee, and the third at the ankle. A spring reaches from the crest of the ilium down over the outside of the thigh to the knee, to which is attached a wide, soft-padded band passing around inside the thigh, by means of which all the lateral traction which the patient will tolerate is exerted. Extension in a line with the body is had from adhesive plaster applied to the leg and counteracted by a leather belt around the waist, to which the loose iron body-band is looped.

The power of both extensions being equal, the mean extension will be seen to be in an axis with the neck of the femur.

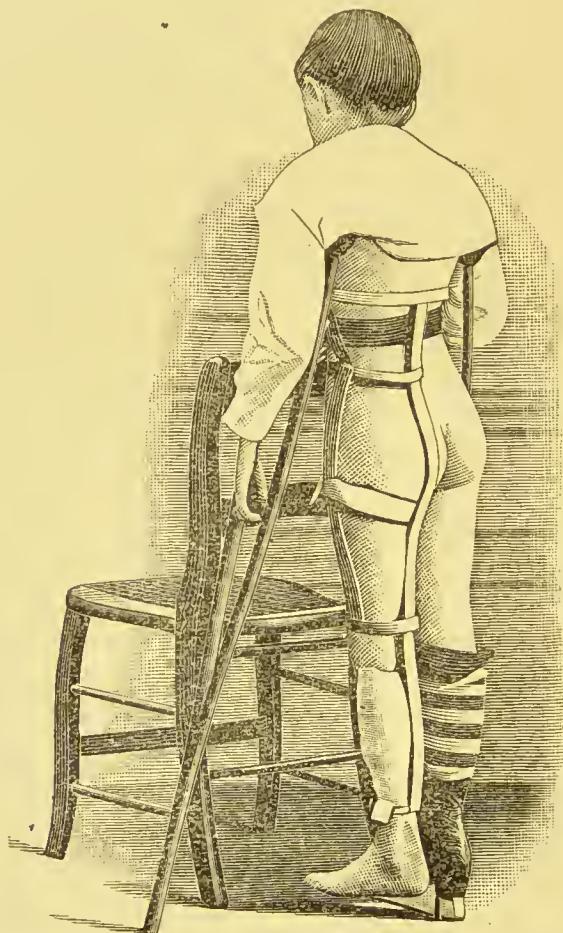


FIG. 54.—Dr. Wallace Blanchard's Splint.

The main strip down the back, thigh and leg secures nearly complete immobility, and he has come to look at this as almost as necessary as in fractures. The surface of the splint next to the body is padded and the whole instrument is covered with sheep-skin. A pattern or cork sole is placed under the foot of the unaffected side, of such thickness as shall prevent the other foot from touching the floor. The patient is given a pair of crutches and told to take all the exercise in the open air that his general condition will permit. The splint should be moulded perfectly to the form and be painless to wear, or it has not been properly applied.

He considers it beyond question that a really efficient apparatus for hip-disease must meet three requirements:

First. It must afford traction outward as well as downward so that a mean force exerted shall be in an axis with the neck of the femur and thus relieve from pressure all the articulating surfaces of the joint.

Second. It must afford immobility.

Third. Allow of unlimited out-of-door exercise, as far as pain or danger to the diseased joint is concerned.

The joint is now protected from jar or concussion and both factors of friction are largely overcome. The adduction of the leg with the accompanying lordosis, which is nearly invariable as the disease

progresses, and which is due to the unrelenting tonic contraction of the adductor muscles, is in most cases nearly or quite overcome on the application of the lateral tension band. As the adductors relax and the leg falls into the natural line with the body, the upright section of the splint should be straightened so far as to conform to the improved position.

C. THE AUTHOR'S TREATMENT.

Materials.—Those needed are:

1. *Moleskin or Swansdown Adhesive Plaster.*

This should be cut in two lengths—one sufficient to more than encircle the abdomen, and the other the thigh, and each to be from one to two inches in width. Enough of these strips should be prepared beforehand to cover the thigh from the knee to the hip, and from the hip to the axillæ.

2. *Plaster-of-Paris Bandage.* Of these from four to six usually suffice—the length and width depending upon the age of the patient.

3. *Two tablespoonsful of salt dissolved in warm water.* This should be placed in a vessel of sufficient depth to allow the plaster bandages to be entirely covered by the solution after their immersion. A two-quart tin pail is usually the most satisfactory article which can be obtained readily for this purpose, as almost every household is provided with one or more. The object in adding the salt is to force the plaster-of-Paris to "set" more quickly, and in cases where

partial suspension is employed its use shortens the time of traction very materially, to the great comfort of the patient.

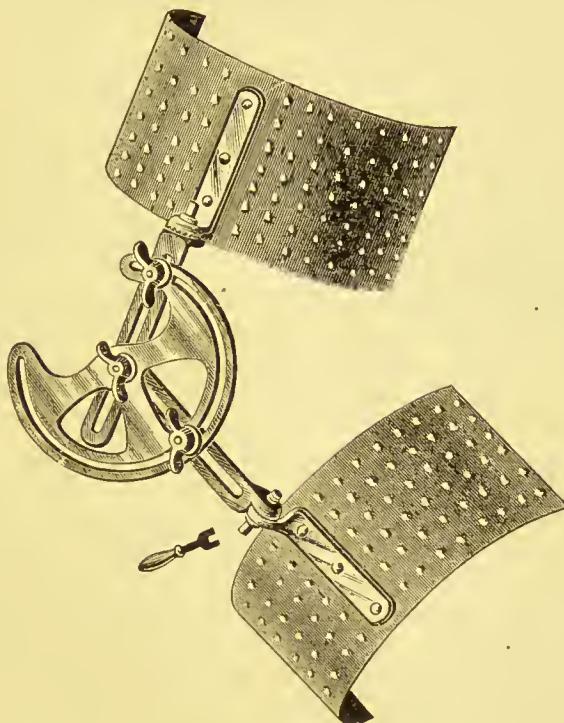


FIG. 55:—Stillman's Sector Hip-Splint.

4. *A Sector Splint.* It is well to give specific directions to the instrument-maker in ordering this splint for the hip. The slotted arc should be almost $\frac{3}{4}$ of a circle in extent, and the slotted bridges should be provided with ratchets for abduction or adduction,

and inversion or eversion. They should be made of the best steel, and so accurately cut as to allow the various portions to work freely upon one another. To connect the parts of the splint together, either of two forms of clamps may be used. If the surgeon can trust his patient not to alter the arrangement of the splint during his absence, thumb-screws are preferable, but if he wishes the brace to remain unchanged until his next visit he should specify to the instrument-maker that the key and clamps be substituted for the thumb-screws, although in most cases it is advisable to provide a set of each—A ratchet for abduction and adduction, and also one for rotation are also to be placed above and below the slotted arc of the sector.

5. *Rolls of Bleached or Unbleached Muslin Bandage.* These are used to cover all the plaster-of-Paris surface before it sets, in order that a clean surface will present externally.

6. *The Inclined Plane.* One of the forms shown in Fig. 34, as used by Dr. C. F. Taylor, or in Fig. 6, as used by Dr. Bradford, may be employed in conjunction with an ordinary bed, but I wish strongly to recommend a modification (see Fig. 56) which I have arranged of Dr. A. M. Phelps' (see Fig. 7) portable couch, which possesses many advantages over the original. The Phelps' frame is horizontally continuous, but in the modification here shown it is divided transversely opposite the hip and each segment is

provided underneath with my compound clamp* (see Figs. 56 and 57) which admits of their being placed at any angle with the body part of the couch and with each other. A ball and socket provided with a clamp may be used, but it is not so efficacious. In addition the limb segments are made equal in length, and as

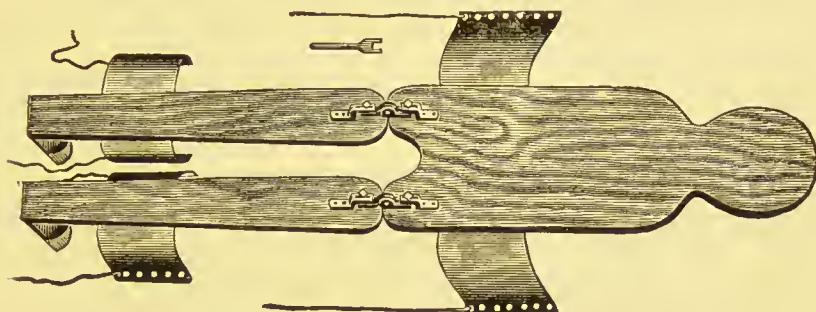


FIG. 56. Stillman's Combined Portable Couch and Adjustable Inclined Plane for the Treatment of Hip Disease.

the sector produces a local extension of the hip, the bandaging of the entire limb necessary in the Phelps' method is obviated, to the increased comfort of the patient.

The question now naturally arises: How long must this frame be used? And the author's answer is, until the limb has regained its normal arc of motion.

Taylor and others have insisted that the inclined plane should be used until the limb is in line with the

* This compound clamp was first presented to the profession through the columns of the New York Medical Record.

body, but the author goes further and insists that its use be continued until the normal degree of motion in every direction is reached, and this can be done without prejudicing the health of the patient by steady confinement since *the presence of the sector splint at the hip allows him to be removed from the portable*

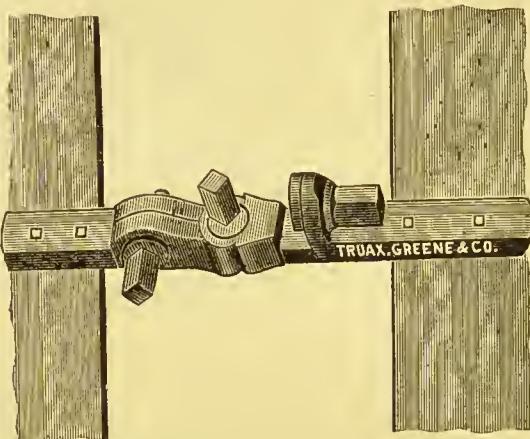


FIG. 57. Stillman's Compound Clamp.

frame as often as necessary for exercise with the crutches and high shoe. These should be used long after all signs of the disease have disappeared, but the plaster-of-Paris attachment of the sector may be discarded when convalescence is assured, and a protective removable splint (see Fig. 59), which admits of traction, can be substituted. The portable frame should be used at night both during the disease and long afterwards as a bed.

APPLICATION OF SPLINT. The patient should be *partially* suspended while seated in an upright position on the edge of a chair or bed, the limbs being flexed at a right angle with the body, and the heels and legs resting upon another chair (see Fig. 60). With very young children it is advisable to apply the suspension in the sitting position several times previous to the application of the splint, as they thereby become used to the procedure and it is thus robbed of its terrors.

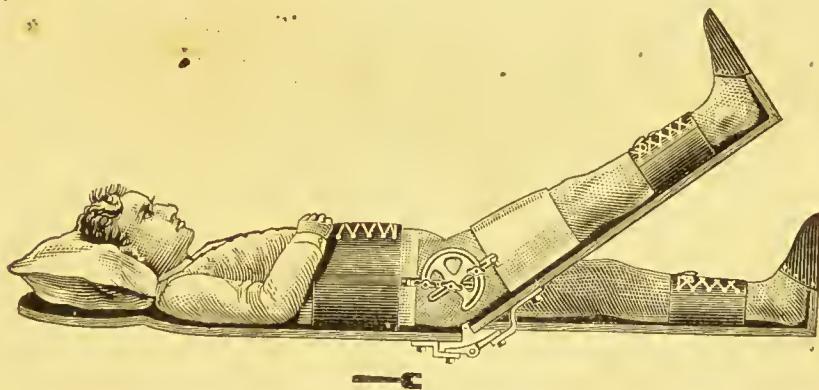


FIG. 58. Stillman's Hip Apparatus (complete).

Have the materials all at hand before commencing, and the presence of an assistant is preferable, although not absolutely necessary. Next fit the splint accurately by bending the bridges at the angles. If the patient is an adult, see that the hair is shaved from both the body and thigh. With children this of course is not necessary. When everything is ready, and the patient in position, *first* encircle the

thigh of the affected side and the body from the groin to axillæ with moleskin adhesive strips, using the [scissors] freely to *avoid wrinkles*, as these are apt to cause excoriations.

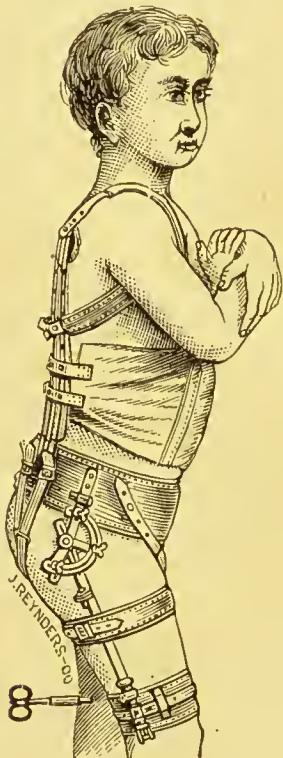


FIG. 59. Stillman's Protective Hip-Splint.

Second, Plaster-of-Paris bandage should now be applied rapidly to both thigh and trunk, and the splint, with all clamps loosened, placed in position

and bound down by more plaster-of-Paris bandage, taking care to have the centre of the sector opposite the hip-joint, and the bridges in the axes of the thigh

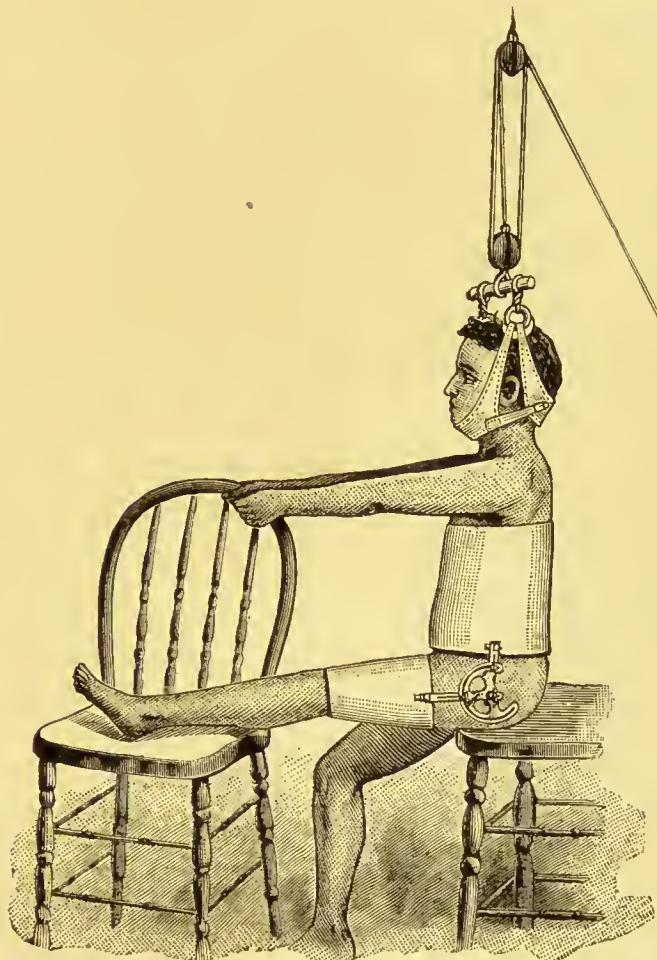


FIG. 60. Application of the Sector Splint.

and body, by fastening the screws of the sector. In this manner we obtain a complete local extension and fixation of the joint to any desired degree, without making traction upon the entire limb, as is done when Buck's extension is used, and we are enabled to produce:

1. Local fixation of the hip.
2. Fixation of the joint at any angle, with or without local extension.
3. Motion limited or complete, with or without local extension.
4. Gradual reduction of deformity.
5. Opportunity for local inspection, application and treatment of abscess without removal of the splint.

The question very naturally arises here, Shall an anæsthetic be administered to aid in reducing the flexion? This, in my experience, has not proved to be a necessity; but it can be employed without the least harm, provided that only very slight force is used. The next day the clamps of the sector splint should be loosened and the inclined plane lowered to adjust itself to such a degree as the angle of flexion will be reduced without the use of force. The clamps should be then again tightened, and the procedure may be repeated almost daily.

The plaster-of-Paris bandage should not extend beyond the adhesive plaster at any point, and the observance of this precaution will prevent excoriation at

its borders. Next, before the plaster sets, apply the roller bandage neatly and rapidly over the whole, and when the plaster becomes firm—as it will in a short time—the patient may be removed to the bed, upon which an inclined plane has already been provided.

Do not tighten the clamps of the splint until the plaster becomes thoroughly dry, which process usually occupies several hours. A perineal band is next to be applied and attached to the angle of the upper bridge. This may be improvised by using an old handkerchief stuffed with wool or cotton-batting and covered with oiled silk, and when used its extremities may be connected by a strong safety-pin or, preferably, by a strip of wide tape and a buckle. An instrument-maker can, however, on application, provide one of the usual forms of perineal bands, if so desired. After placing the child upon the frame, the screws of the sector being still loose, the leg-piece supporting the affected side should be fastened by its clamps at the angles of inclination most comfortable for the patient, after which traction is made upon the hip by the hands of an assistant and the joint locked up by the sector. When applying the splint, be sure that the space between the terminal plates is shortened as much as possible by pushing the parts of the splint together, so that the joint may be stretched and extension thereby secured.

Always produce extension upon the upper bar—never

the lower, if motion be desired in connection with the extension.

An important advantage possessed by the combined use of the inclined plane and the sector splint, consists in the ease with which a patient can be lifted out of the frame to exercise with the crutches and high shoe, and for bathing or other purposes, without permitting interference with the local treatment at the hip; but another great advantage lies in the fact that the compound clamps on the sector splint and the frame allow deformity in any direction to be overcome without losing control of the extension or fixation of the joint. The limb segments of the frame can be separated to any desired degree, and there fixed to overcome adduction—or they can be approached and even overlap each other to overcome abduction.

The combined use of the sector splint and the frame (see Fig. 58) affords such complete control of the joint that it renders the treatment of inflammatory conditions comparatively easy.

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